Russia's Grizzly Coast: A Case Study of Decision Making at the Minnesota Zoo

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Senior Comprehensive Exercise



Figure 1: Early sketch of the lava tube in the Minnesota Zoo's Russia's Grizzly Coast exhibit

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Abstract

Zoos have been accused of choosing animals for their collections that are appealing to visitors at the expense of animals that need more conservation attention. The purpose of this study is to examine what factors affect animal selection decisions at zoos. These factors are important because they reveal zoos' priorities and obstacles, which affect how zoos contribute to conservation. We chose to focus our research on the decision making process behind the Russia's Grizzly Coast exhibit at the Minnesota Zoo in order to determine which actors and factors were important in the exhibit's creation. We found that economic viability, animal welfare, visitor preference, sustainability of the exhibit, education programs, and conservation goals were the most important factors in the decision process; however, each goal was inextricably tied to economic viability, which is closely related to visitor preference. In addition, we found that an individual actor, the zoo president, was extremely influential in the process.

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Introduction

Species are being lost at a rate 1,000 to 10,000 times higher than they would be in the absence of human activities, which translates to dozens of species going extinct every day (Diversity 2015). In light of these dire circumstances, creating effective animal conservation programs is increasingly important. Many modern zoos recognize this imperative and have made animal conservation a core part of their mission. Zoos contribute to conservation in a variety of ways, including educating visitors about conservation issues, providing support to in situ conservation programs, and participating in cooperative breeding programs with other zoos. Zoos are among the most significant players in animal conservation, collectively ranking behind only the Nature Conservancy and the World Wildlife Fund for in situ conservation expenditures (Gusset and Dick 2011). Zoos play a large role in ex situ conservation as well, considering that approximately one out of every seven threatened terrestrial species is held in zoos (Conde and others 2011).

Zoos are unique from other conservation organizations in that they are not singlepurpose institutions. They are centers of entertainment and education as well as conservation, and they must balance these roles in order to attract revenue and continue to operate. Our research explores how the pressures associated with these roles affect zoos' decision-making processes, specifically in regards to which animals are chosen for exhibits. We chose to focus on exhibit animals rather than in situ conservation because these animals are at the center of potential conflict between entertainment and conservation considerations. The outcome of zoo decisions about which animals to exhibit is important because zoos are influential players in species conservation and species are becoming increasingly threatened. The species that zoos choose to conserve will impact which species are protected. In order to understand which species are likely to be chosen by zoos and therefore receive conservation support, it is necessary to understand the decision process behind animal selection within zoos. The goal of our research is to address this question: What factors are driving the decisions behind animal selection at zoos? We explored this question by examining the creation of the Russia's Grizzly Coast exhibit at the Minnesota Zoo.

Literature Review

Animal Conservation:

Biodiversity loss is an anthropogenic problem that has far surpassed natural rates of extinction (Ceballos 2015). Continuing our current trends, humans will be responsible for rates of extinction qualifying as the sixth mass extinction in the earth's history (Bellard 2012). Habitat loss and hunting exploitation are the main causes of this rapid decline, with recent literature pointing to climate change as another major cause (Bellard 2012, Pimm, S.L., Visser, M.E.,Keith, D.A. et al. and many more). Although there has been a large amount of awareness brought to this issue, current land use and hunting policies have not been sufficient to reduce our ecological impact. With failing policies, many scientists have turned to the goal of saving minimum viable populations (MVPs) or the minimum number of animals in a species that can maintain genetic diversity for future populations (Lynch 1998). This number is commonly estimated to be at least 500-1000 individuals in a population (Lynch 1998, Franklin 1998), however recent studies put some species' MVPs as high as 7000 (Reed 2003). Many environmental organizations and institutions have arisen with the goal of species preservation, including modern zoos.

Zoos as Institutions of Conservation:

The missions of zoos over the past 50 years have changed dramatically from institutions of entertainment to institutions of conservation. In the past, zoos' main function was to be menageries or educational living museums (Rabb 1994). With increased pressure from animal rights groups and the growing awareness of the severity of species loss, zoos have gradually taken on a more ecological role (Rabb 1994). Zoos are acting as institutions of conservation in a variety of ways. One method by which zoos carry out this goal is by providing conservation education (Moss 2010, Patrick 2007). With 700 million people visiting zoos annually worldwide, zoos are in a pivotal role for bringing awareness to ecological issues (Gusset 2010). However, recent studies have shown conservation education programs to be largely ineffective (Jamieson 1995).

Increasingly, zoos have begun implementing in situ and ex situ conservation programs. In situ conservation focuses on species recovery and habitat protection in an

animal's natural environment. Founded in the idea that maintaining MVPs is a last resort in species recovery, in situ conservation programs funded by zoos have been praised as an effective means of conservation (Snyder 2002). Ex situ conservation, the relocation of endangered species from their natural habitats to preservation areas like zoos, has been criticized for its costliness, poor success in establishing self sustaining populations, and poor success in reintroduction (Snyder 2002). Although many argue that more effort should be put into in situ conservation, ex situ captive breeding programs have been extremely effective in the recovery of endangered species when there are no alternate short term solutions (Lewis 2001, Snyder 2002).

Zoos' Conflicting Goals:

Although ex situ programs have been successful in maintaining populations of some endangered species, many species kept in zoos are not endangered, including the brown bears in the Russia's Grizzly Coast exhibit at the Minnesota Zoo. This fact implies that conservation is not the only factor influencing which animals are kept in zoos. Rather, zoos must balance multiple goals along with conservation, including education and entertainment. Previous studies have recognized the potential conflict between these goals. Particular attention has been paid to patterns that exist in visitor preference and how they may influence animal selection. For example, Moss et al. 2010 observed how often visitors to a zoo stopped to view various animals and for how long. They found that mammals were the most popular, and that characteristics such as body size and amount of activity were also important (Moss et al. 2010). This pattern of preference has been found in other studies as well (Ward 2011). Frynta et al. 2013 studied mammal populations in zoos to see if their numbers are correlated with their popularity. The study found that the human-perceived attractiveness of mammalian families was a significant predictor of whether or not the animals are kept in zoos. Furthermore, the study found that larger, more attractive mammals are kept in more zoos and in larger numbers than other mammals (Frynta et al. 2013). Martin et al. 2014 took the final step to connect visitor preference with conservation tradeoffs. In a study that compared 165 mammal and 228 bird species kept in 550 zoos with related species who are not kept in zoos, Martin et al. found that in general, the species in zoos are less endangered than their relatives. The

evidence would suggest that zoos forego at least some conservation potential in order to cater to visitor preference.

If animal choice is so tied to visitor preference, does visitor preference weigh more heavily than conservation concerns in animal selection? As discussed above, zoos are significant players in ex situ conservation, and many of these programs are successful at maintaining species populations. The studies described in this section focused on which animals are kept rather than how they are chosen, which does not fully capture the relationship between visitor preference, conservation goals, and other factors in the decision making process. Our study aims to address the interaction of these factors in order to provide more insight into the tradeoffs that must be made between them.

Previous Studies:

Investigating the decision making processes in zoos is a topic that demands more attention. To our knowledge, based on a thorough search of the literature, no systematic study of the decision making process behind animal selection in zoos has been done. We believe that decision making analysis should be applied to zoos because of the immediate importance of species conservation. Although decision making processes have yet to be studied in zoos, there have been a few studies evaluating conservation effectiveness in zoological institutions.

The majority of research concerning zoos focuses on visitors as the unit of analysis and education as the main topic. For example, Moss and Esson 2010 used visitor surveys to determine whether conservation education in zoos is effective. They found that visitors are more likely to be impacted by education surrounding large mammals, in keeping with the popularity of these animals explored in other studies (Moss and Esson 2010). Wagner et al. 2009 also conducted surveys, this time to assess the learning outcomes of visitors to the Philadelphia Zoo. The results suggested that out of the five areas examined in the survey (conservation motivation, conservation knowledge, pro-conservation consumer skills, conservation values, and readiness to take conservation action) visitors are most likely to improve their conservation motivation and their conservation knowledge (Wagner et al. 2009). Since these studies survey visitors rather than zoo administrators, they evaluate visitors' perceptions of conservation efforts rather than the actual effort of the institution. In order to assess zoo conservation efforts, we must evaluate the actions of the administration.

Very few studies have focused on the administration side of zoos. Two examples of studies that address this topic are Gusset and Dick 2010 and Maciaszek 2012. Gusset and Dick 2010 evaluate 113 in situ conservation projects supported by zoos. First, they broke the projects into categories based on their main activity (education/training, habitat protection, research, or species protection). Then, they measured the importance, volume, and effect of each project, allowing for different criteria for different activities. The data for their measurements were gathered via a survey to the project leaders, who were not aware of the measurements being used. In general, importance was a measure of the scale of the project, and effect was a measure of its outcome. Each project received a score of 1-5 in each of the three factors and was given a total score using the formula *Importance x Volume x Effect*. The study suggests positive impacts on conservation by the zoos studied.

Maciaszek 2012 focuses more on the efforts of zoos rather than trying to quantify direct impacts on species preservation. Maciaszek examines six areas of effort: education, research, captive breeding, in-situ conservation, collaborations, and associations. For each area, she develops criteria for scoring zoos' efforts on a stepwise scale from 0-4. For example, a zoo with no involvement in conservation-related education would receive a zero in education, while a zoo that only did tours or keeper talks would get a one. A zoo that had tours or talks plus the level two criteria would get a two, and so on. Maciaszek uses an extensive literature review to define the factors and develop the ranking classification system. She uses information from the zoos' websites for identifying the programs they offer. In addition, Maciaszek conducted interviews with ten zoo practitioners from three different zoos to get their perspective on how the zoos contribute to conservation. She found that the zoos in the study overall made contributions in the areas listed above; however, the study did not address how the zoos chose to make these contributions and constraints such as budget were not considered.

Neither Maciaszek nor Gusset and Dick addressed the process behind zoo programs, instead choosing to focus on outcomes. Of course it is important to evaluate whether or not zoo programs are making an impact; however, without understanding how this impact is

achieved it is difficult to make improvements. With this in mind, Miller et al. 2004 conducted one of the most cited studies on researching conservation in institutions. The group created a list of eight questions that could be used to evaluate how conservation is embedded into the operations of zoological institutions. The questions were based on what the authors believed to be reflections of institutional commitment to conservation. The questions are focused on the institutions' actions; for example "Does conservation define institutional policy decisions?" and "Does the institution have a functional conservation department?" Miller et al. motivate the set of questions by explaining that institutions should be held accountable to their missions of conservation and that having such a mission may increase public and political support, which would in turn help further conservation goals in these institutions. Miller et al. did not provide examples of specific decisions and did not consider factors outside of conservation. Rather, the authors' goal was to provide a framework for beginning to evaluate how conservation is included in decision making processes at zoological institutions.

Because past studies on conservation in zoos have focused on conservation decision outcomes, further research into the process of how these decisions are made is imperative. We believe we can offer more information to the literature by identifying all of the important factors involved in the process, and more specificity by following the entire process in a case study. We implemented a qualitative analysis on the decision making process of a zoo by conducting a case study following the administrative decisions behind the creation of the Minnesota Zoo's Russia's Grizzly Coast exhibit and the choice to house grizzly bears.

Decision Making:

The first step toward understanding how zoos can make the best animal conservation decisions is by understanding the process by which animals are currently selected. Network analysis attempts to explain and analyze the way in which individuals combine and collaborate to create functional social orders. Analyzing these connections can offer insight into the organization of a network, and give a map of collaborations between individuals, or actors. Decision making in zoos is an open-system network, or a network where the extent of the network is not clearly defined. These types of networks are often

the most difficult to study because of their ambiguity (Claywell). Network Analysis is used in a variety of disciplines to better understand networks for future decisions and to increase effectiveness in a network. Some ways that this has been done is by identifying stakeholders to promote trust in decision implementation and effectiveness (Cross et al. 2015; Guerrero, 2015; Borgatti, 2009). Understanding and documenting the major factors involved in a decision is also useful for future planning within an institution. This methodology will likely prove effective for evaluating networks in the context of zoo decision making.

Study Site Information

The Minnesota Zoo opened in 1978 in Apple Valley, Minnesota. It has grown to cover 485 acres and house about 4,700 animals. It is a state agency, and receives part of its operating budget (currently about 30%) from the state. The zoo's stated mission is "to connect people, animals, and the natural world to save wildlife." With this goal in mind, the Minnesota Zoo participates in extensive education and conservation programming. According to the zoo website, over 484,000 people participated in Minnesota zoo education programs during 2013, including almost 90,000 students. The zoo participates in 90 Species Survival Plans (SSPs), which are cooperative breeding programs that are managed by the Association of Zoos and Aquariums. One of these SSPs is for the Amur leopard, which is considered highly endangered by the IUCN and is part of the Russia's Grizzly Coast exhibit.

The Russia's Grizzly Coast exhibit is located near the center of the Minnesota Zoo. It focuses on the Kamchatka Peninsula of Russia (Appendix B and C). The animals in the exhibit are Amur leopards, sea otters, wild boars, and brown bears. The species of brown bear in this exhibit is not considered highly threatened by the IUCN. The region of Russia that the exhibit focuses on, Kamchatka, is one of the areas most densely populated by brown bears, with a population of about 17,800 in 2008 (Paczkowski).

Methodology

Our research focused on three main objectives:

1) To determine the major factors that need to be addressed when choosing to introduce a new exhibit/species in the zoo.

2) To identify all key actors in the decision making process and document their connections with each other.

3) To construct a timeline of the major steps in the decision making process. We pursued our objectives by examining existing literature, conducting interviews with Minnesota Zoo personnel, and reviewing documents associated with the Russia's Grizzly Coast exhibit.

Case Study:

We chose to implement case study methodology to collect qualitative data on the decision to house bears at the Minnesota Zoo. A case study is defined as an "in depth, multifaceted investigation, using qualitative research methods of a single phenomenon" (Feagin 1991). Case study research is useful for evaluating information from a variety of sources over time, allowing for a more holistic study of a complex social network (Feagin 1991). Another benefit of the case study is that it allows the observer to understand an action in a manner that is closest to how it is understood by the actors themselves. As our research aims to primarily investigate the factors that each actor felt was important to their individual contribution to the decision making process, this is an ideal form of evaluation. Case studies also help unearth complexities in human motivation (D'Andrade 1992, Feagin 1991). We gathered our information through surveys and interviews.

The reliability of case study data is often questioned, however there are multiple methods that can be used to reduce bias in our findings. First, it is important to follow the same format for each interview. We created an interview outline and asked the same questions of each interviewee (Appendix A). We also aimed to eliminate biases in our questions. We chose to not have any pointed language or ask a question specifically about conservation, although this was the factor that we were majorly interested in. We used common survey language when asking for the ranking and selection of factors, and provided examples when necessary. It is also helpful to conduct research in a team, so that interpretations of data can be checked by multiple people. In our investigation, each interview and each survey was interpreted by both researchers. Recording our interviews also helped us cross-reference our findings, and identify themes between interviewees.

Case Selection:

The Minnesota Zoos' decision to house brown bears was chosen as the focus for our case study for a variety of reasons. Firstly, it was important to conduct interviews face-to-face and to be able to visit the exhibit and the animals being studied. This necessitated our research take place at the Minnesota Zoo because of our location. The Russia's Grizzly Coast exhibit was chosen because it was a relatively new addition to the zoo, and many employees working at the time of the decision to create the exhibit were still employed by the Zoo. The exhibit was also well documented because of its award winning design and ingenuity. The brown bears became our focus because they are the exhibit's highlighted animal.

Interviews:

We conducted interviews to gather qualitative data and attempted to eliminate any biases through a variety of methods. To find our interviewees, we contacted the former president of the Minnesota Zoo, who we knew was a major actor through a news article, and asked who he communicated and collaborated with in the decision making process (See Appendix A). We continued identifying decision makers in each interview to compile a list of people who had participated in the decision making process from each department of the zoo administration. We reached out to all of these individuals, and scheduled interviews with the actors who responded. Because some participants refused to be interviewed, we may have self-selection bias. Thankfully, close to all of the individuals we reached out to responded. Our interviews were partially tailored to the individual and their role in the zoo administration, however we always asked the same seven questions from our survey in each of our interviews (Appendix A). In total, we conducted five in-person or over-the-phone interviews with people involved in the Russia's Grizzly Coast decisionmaking process. These include the President of the zoo during that time, two members of the Zoological Board of Minnesota, the Curator of the Northern Trail (the section of the zoo where RGC is located), and the zoo's Head of Animal Collections. In addition, we exchanged emails with the Minnesota Zoo's Vice President for Conservation, and the zoo's Vice President for Finance and Administration.

Findings

Major Groups Involved in RGC Decisions:

The Management Structure of the Minnesota Zoo:

Management at the Minnesota Zoo is organized into the following departments: External Relations, Biological Programs, Administration, and Education. There is a vice president that oversees each department. These vice presidents make up the senior management team, which is headed by the president of the zoo. The executive director of the Minnesota Zoo Foundation is also involved with the management team, although the Foundation is not legally the same entity as the zoo. The Foundation was created to solicit funding on behalf of the zoo, which is a state agency and therefore cannot directly fundraise the way the foundation can. The Minnesota Zoological Board is the arm of the state government that oversees the zoo. Its main roles include electing the president of the zoo, creating and approving the zoo's annual budget, and advising the president on proposed capital projects, including new exhibits. The Board is also in charge of working with zoo leadership to formulate the zoo's master plan, which serves as the framework for the zoo's development and guides zoo staff and administration. The governor of Minnesota appoints fifteen members to the Zoological Board and the remaining fifteen positions are elected by the previous years' board members.

The zoo senior management team, the Minnesota Zoo Foundation, and the Minnesota Zoological Board are all directly involved in the process of creating exhibits. Their participation mainly takes the form of various committee meetings, which will be described below in the "Steps of the Decision Process" section. For the sake of brevity, this group of three entities will be referred to as "zoo administration" in this paper.

We found that the president of the zoo has particular influence over the decision making process. The president at the time that Russia's Grizzly Coast was being created was Lee Ehmke. Because of Mr. Ehmke's influential role in designing the exhibit, his motivations and experiences are relevant to understanding the exhibit's origins. Mr. Ehmke demonstrated an interest in conservation long before he came to the Minnesota Zoo. He worked for the Sierra Club Legal Defense Fund as well as the California Costal Commission before getting a degree in landscape architecture. In 1988 he began as an exhibit designer for the Bronx Zoo, where he would eventually become Director of Design. Mr. Ehmke helped create the Congo Gorilla Forest, a famous exhibit at the Bronx Zoo. He became the president of the Minnesota Zoo in 2000 (Wood 2010).

Outside Organizations:

As described above, there are many layers to the management structure of the Minnesota Zoo. To make things even more complicated, decisions surrounding exhibits include parties that are not directly affiliated with the zoo. In particular, the zoo has to work with outside organizations to obtain the animals for its exhibits. In the case of Russia's Grizzly Coast, these parties included the United States Fish and Wildlife Service, the Alaska Department of Fish and Game (ADFG), and a privately owned farm called Shadow Nurseries. The brown bears came from the Alaska Department of Fish and Game, or the ADFG. When the Minnesota Zoo decided it was interested in keeping bears, it contacted the ADFG, which then arranged to transfer three orphaned bears to the zoo. According to the animal collections manager of the Minnesota Zoo, orphaned bears are euthanized every year because the ADFG finds more than it is possible to place in zoos or other facilities.

The AZA and Other Zoos:

In addition, the actions of the Minnesota Zoo are tied to the entire network of other zoos in the United States through its membership in the American Association of Zoos and Aquariums (AZA). The AZA has a set of standards that it requires zoos to meet in order to become accredited, covering everything from commitments to education and conservation to specifics about animal care and staff requirements. The AZA also coordinates Taxon Advisory Groups (TAGs). Each TAG is responsible for assessing the conservation needs of a group of species across zoos. For example, the Minnesota Zoo's Supervisor of the Northern Trail/Russia's Grizzly Coast is a member of the TAG for bears. Some TAGs create Species Survival Plans (SSPs) to facilitate cooperative breeding programs between zoos. For example, the Minnesota Zoo participates in a breeding program for Amur tigers that involves transporting the animals between different zoos. In addition, other zoos may play a role in the decision process in an advising capacity. When the Minnesota Zoo was considering keeping brown bears, the animal collections manager consulted with the Woodland Park Zoo in Seattle about its success in keeping the animals.

The Minnesota Zoo must follow AZA guidelines in its operations; however, the AZA has no direct control over which animals the zoo chooses to keep. Participation in any inter-zoo programs is voluntary, so other zoos do not have direct control over what animals the zoo keeps either. Therefore, these actors are indirect influences rather than direct actors in the decision process.



Figure 2: Major Groups That Affected RGC Decision Making

Fig. 2: A map of the major groups involved in the decision making process surrounding the creation of the Russia's Grizzly Coast exhibit at the Minnesota Zoo. The dotted lines indicate indirect involvement, meaning a group affects zoo operations but did not directly give input about RGC. For example, the zoo had to follow general AZA guidelines when creating the exhibit just as when performing all of its operations, but the AZA does not have any say about what animals the zoo chooses. Visitors are included on this map as indirect contributors because zoo officials have to consider what visitors want to see. This element is discussed further in the "Factors" section of this paper.

Steps of the Decision Process:

The first hint of what the Russia's Grizzly Coast exhibit would become appeared in a rough sketch on a napkin by then-president of the zoo Lee Ehmke. That was in 2003, five

years before the exhibit opened to the public. The first three years were spent planning and fine-tuning the exhibit, followed by two years of construction. Along the way were the budget requests and committee meetings that shaped the final exhibit.

A memo that Mr. Ehmke wrote to the Minnesota Zoo administration on March 3, 2003, details how the Russia's Grizzly Coast exhibit was actually the result of a change of plans. The master plan, adopted by the zoo in 2001, contained a strategy for improving the center of the zoo by creating the Asia Trail Gateway. In Mr. Ehmke's words, the gateway would have been a "solid, if perhaps unspectacular series of exhibits." Instead, Mr. Ehmke proposed a more striking exhibit featuring brown bears and sea otters. He wrote in the memo that he was suggesting the new plan due to "the changing economic and political landscape." The landscape he referred to included the zoo's failed capital budget proposal to the state legislature in 2002, which asked for about \$18 million to begin renovations, including the Asia Trail project. The legislature approved only \$8.1 million, and Governor Jesse Ventura vetoed it entirely. This lack of support from the government prompted Mr. Ehmke to take what he hoped would be a more compelling approach.

Over the next year, Mr. Ehmke met with members of zoo management, the Zoological Board, and the Foundation to continue to develop the concept of the Russia's Grizzly Coast exhibit. The basic progression of the concept of the exhibit—which was explained to us by Tony Fisher, the Head of Animal Collections, and which we confirmed with other accounts and documentation—goes something like this:

Working within the larger goals of the zoo (as stated in the master plan), Lee Ehmke formulated the original idea for the Asia Trail Gateway exhibit in 2001. The exhibit was meant to fill the need for a more cohesive and inviting entrance to the other exhibits, as well as to incorporate other aspects of the master plan. Furthermore, Asia was chosen because the climate is similar enough to Minnesota's that animals could be outside in the winter. When Mr. Ehmke proposed altering the exhibit, climate was still a major consideration. The Kamchatka peninsula of Russia fit this criteria. The zoo already housed Amur tigers from a nearby region, making it an even more attractive choice for the focus of the exhibit. The area also suited another one of the zoo's goals from the master plan, which was to create an exhibit with a conservation theme. Interestingly, it is the peninsula itself, with its pristine but threatened wilderness, rather than the animals themselves that caught

the attention of Mr. Ehmke and those he collaborated with. The animals were significant for another reason that Mr. Ehmke mentioned in his memo: they were "charismatic macro vertebrates," in other words, the type of animals that people want to see.

These major ideas were the building blocks of the exhibit, but they were only the bare bones of the decision process. Exhibit planning took 2 years, and consisted of a series of meetings held by the planning committee at the zoo, the Minnesota Zoological Board, and the Foundation. The planning committee met about every one or two months. It consisted of multiple smaller committees that met more frequently and addressed specific issues within the exhibit creation process. For example, Tony Fisher served on the committee in charge of animal acquisition. He helped confirm, for instance, that the Alaska Department of Fish and Game would have brown bears available. The Minnesota Zoological Board also functioned with subcommittees to address specific areas of interest within the decision process. We spoke to one member who was on a subcommittee focused on planning the conservation goals of the new exhibit. She told us that meetings were held about once per month. Members of the Minnesota Zoo Foundation sat in on planning meets as well as Zoological Board meetings. The main role of the Foundation members was to help figure out how to attract donors to fund the exhibit.

Despite the careful planning of the zoo administration, the next budget proposal that they submitted to the state legislature for \$48 million for fiscal year 2004 was rejected, along with all other capital projects proposed that year (the state legislature did not pass a capital budget). Finally, the legislature granted the zoo \$20,640,000 in 2005 for projects relating to its master plan, including Russia's Grizzly Coast. At this point, the administration began working with an architectural firm and implementing its plan for the exhibit. Although there were undoubtedly additional construction decisions after this point, our research did not focus on these since the animals for the exhibit had already been chosen. The decision process culminated in the opening of the exhibit in 2008.



Fig. 3: A timeline summarizing the major steps in the creation of the Russia's Grizzly Coast Exhibit. The award that the exhibit received in 2009 was from the AZA.

Social Networks:

Analyzing the social network of The Minnesota Zoo is complex due to the the openboundaries of the network and the intricacies of each individual's' experiences and influencers within the network. Following social network theory, we have identified our actors but still need to understand how they are connected, who is central to the network, and who has the greatest degree centrality. Most actors in the decision making process collaborated informally through conversations at the zoo, while other collaborations took place in formal meetings. Other methods of contact were through e-mails, memos and phone calls. Major decisions made during the process, such as the creation of the master plan and animal selection, are discussed in formal meetings of zoo administration. This includes the vice presidents of each department, the president, administrators from the zoo and the Zoo Foundation, and the Zoological Board. To identify central members of the network, we can look at the number of firstorder connections each actor had in the process. First-order connections are links between one actor and another, while a second-order connection is where two links and one actor separate two members in a network from each other, ie. they are linked by one degree of separation. By far, Lee Ehmke had the most first-order connections, with his network spanning all departments. This centrality makes Mr. Ehmke the 'hub' in this network. Although it would seem that those who had the most connections would be the most important in a network, it is important to analyze not only the number of connections an actor has, but how actors connect to the otherwise unconnected. This form of evaluation is called betweenness centrality. In this evaluation, the president was also critical to linking multiple members of the network that would be otherwise unconnected. Another important actor in betweenness centrality was the Zoo Foundation Executive Director. This could be because the Foundation's funding role spans all departments.



Fig. 3: A map of Lee Ehmke's decision network and their interconnections. This map was created using Gephi. Node size increases relative to number of connections in the network (ie. Mr. Ehmke has the largest node and the most connections).

Overall, Mr. Ehmke was the chief driver of the decision to house grizzly bears at the Minnesota Zoo. Where the network becomes important, however, is in the implementation

of the decision, where Mr. Ehmke was essential for facilitating connections between every cluster in the network.

Important Factors in Decision Making:

In our exploration of the relevant literature, we came across three factors that have been considered important to zoo decision-making: education, conservation, and visitor preference (Frynta et al. 2013, Moss et al. 2010, Ward 2011). Only the last factor, visitor preference, was directly linked to animal selection. There was some concern that visitor preference was overshadowing other factors, especially conservation. The other factors, conservation and education, have been described as goals of most zoos but have not been directly linked to choices on which animals to keep (for example, Miller et al. 2004). Our findings complicate the understanding that visitor preference overshadows other factors by showing that it is inextricably linked to them. In particular, appealing to visitors influences the amount of money that the zoo is able to allocate to the other factors.

These three factors from the literature were heavily featured in our conversations with zoo administration and our exploration of zoo documents, especially conservation and the role of visitors. However, our research also uncovered other factors that were important to the decision about which animals to include in the exhibit. These factors are animal welfare, the sustainability of the exhibit, and economic viability. In addition, our understanding of the original three factors was greatly expanded. Each factor is discussed below, along with how it featured in the decision making process surrounding Russia's Grizzly Coast.

Economic Viability:

The zoo has to make decisions about which animals to conserve because it has limited resources and therefore cannot take on every project. This theme was present in every aspect of the decision making process surrounding the creation of Russia's Grizzly Coast, which is evident in the roles of the Zoological Board and the Zoo Foundation. As a member of the Zoological Board explained, from her perspective it is difficult not to see economic concerns as the most important consideration because without a budget there cannot be an exhibit. The fact that members of the Foundation were present throughout the creation process also implies the ever-present nature of money matters. Consideration included not only the initial costs of obtaining the animals and constructing the exhibit, but also the recurring costs of animal care and maintaining the exhibit.

Animal Welfare:

Part of anticipating the expense of the exhibit is planning for the costs of taking care of the animals. The Minnesota Zoo collections manager emphasized that this is a significant cost (for example, \$15,000 per year per sea otter), and one that is not flexible because high standards must be upheld. It is intuitive that the welfare of animals is important once they are in the exhibit, but we found that it is also important in the decision to keep them in the first place. In particular, the idea for Russia's Grizzly Coast included consideration of the climate of Minnesota and how the animals would fare in it. This was part of why the exhibit focused on Russia--the animals would be well-suited to Minnesota's cold winters.

Visitor Preference:

Almost everyone we talked to and every document we read mentioned the role of visitors—and in some cases emphasized it heavily. In each case, a connection was made between visitor preferences and zoo income. The more popular an exhibit is, the more people it will attract and the more financially well off the zoo will be. As discussed above, the Minnesota Zoo receives funding from the state, especially for capital projects. However, in 2015, the zoo earned 55% of its revenue on its own. This is an increase from 2001 when the master plan that would eventually lead to Russia's Grizzly Coast was being considered, but admissions have always been a significant part of the zoo's income.

The motivation for improving the center of the zoo, as stated in the master plan, was to provide a more cohesive and welcoming experience for visitors. This puts visitor considerations at the very beginning of the motivations for creating the exhibit. Furthermore, catering to visitor preferences is one of the central goals of the zoo according to the Zoological Board's official mission. Mr. Ehmke wrote in the memo describing Russia's Grizzly Coast that the exhibit would include "charismatic mega vertebrates," which is a reference to the popularity of large animals with visitors. This shows that the specific decision of which animals to include in the exhibit is also related to visitor preference. An aspect that we had not considered prior to conducting interviews with members of the zoo administration is that visitor preference can apply not only to the types of animals selected, but also to where the animals come from. The animal collections manager told us that the origins of the brown bears as orphans was important not only for the practical purpose of obtaining them, but also because people are more comfortable with animals in captivity when they know that the alternative is that the animals are abandoned or euthanized.

Sustainability of Exhibit:

When we spoke to Mr. Ehmke, he told us that a major consideration in animal selection is the sustainability of the exhibit, meaning how likely it is that there will be animals for the exhibit in the future. This is related to the availability of the animals in the long run, not just their immediate availability. For example, it was not about whether the Alaska Department of Fish and Game had brown bears available for the creation of the exhibit, but whether they would continue to have them. As it happens, the ADFG finds multiple orphan bears every year—more than it can place in zoos. It is for this reason that the AZA (as well as the federal government) forbids captive breeding of brown bears. The same is true for sea otters. This point was reiterated by both the curator of the Northern Trail (the area of the zoo in which RGC is located) and the collections manager. They also noted that greater regulation in animal transport, combined with declining availability of animals overall, has made this factor increasingly important when planning exhibits.

Education:

Education was described in the literature as a main goal for zoos--especially education surrounding the importance of species conservation (Patrick et al. 2007). The Minnesota Zoo demonstrates an emphasis on education through special programming as well as signage in its exhibits. The signage in Russia's Grizzly Coast exemplifies this, with many signs displaying information about the zoo's conservation efforts in Russia. A central feature of the exhibit is the Conservation Cabin, which teaches visitors about the Kamchatka Peninsula (the specific area of Russia on which the exhibit is based) and asks them to donate to conservation of the species in the exhibit.

The potential for this type of messaging was considered during the decision to focus on the Kamchatka Peninsula. According to our conversation with Mr. Ehmke, along with the exhibit narrative that was written for submission to the AZA, the exhibit was meant to bring attention to the conservation needs of Russia, as well as display the animals in a way that is close to their natural environment in a way that would be informative to visitors.

Conservation:

The mission of the Minnesota Zoo is "to connect people, animals, and the natural world to save wildlife." Conservation is embedded in this statement, albeit in a broad sense. Conservation is a difficult term to define, which is perhaps why the zoo does not tie itself to one definition in its mission statement or other documents. Our purpose here is to explore how the zoo incorporates conservation into its decision-making, rather than to find a complete definition of the concept. Therefore, we can loosely define conservation as an effort to maintain species populations at levels that will be viable in the long run.

The Minnesota Zoo participates in *in situ* conservation through raising money for field programs. It also participates in ex situ programs, including cooperative breeding with other zoos. For example, the Amur leopards in the Russia's Grizzly Coast exhibit are occasionally transported between zoos for this purpose. Another major way that the zoo supports its mission of conservation is through education, as described in the previous section. These programs do have a clearly defined goal of maintaining 90% genetic diversity for one hundred years; however, this is a difficult goal that most species will not meet.

During the creation of Russia's Grizzly Coast, the zoo administration knew that it wanted an exhibit with a conservation message. This message can be seen clearly displayed in the exhibit's signage, as well as in the prominent "Conservation Cabin" in the center of the exhibit. The inclusion of conservation in the creation process is also evidenced by the presence of the vice president of the Conservation department in meetings and the designation of specific subcommittees in both the zoo management team and the Zoological Board. When we spoke to two members of the Zoological Board, they each expressed a personal interest in conservation that had led them to join the board, suggesting that conservation goals influenced their personal considerations as well.

Interestingly, the focus of conservation for Russia's Grizzly Coast was not on the animals themselves, but rather on their habitat. Although Amur leopards and tigers are highly endangered, the other animals in the exhibit--Grizzly bears, sea otters, and wild boar--are not endangered. The Kamchatka Peninsula, the geographic focus of the exhibit, is a relatively pristine area with a strong bear population; however, it is increasingly being encroached upon by natural resource extraction. The exhibit explains how this development is threatening the habitat and food sources of the animals living there. The Minnesota Zoo works with Amur leopard conservation projects through the Amur Leopard and Tiger Alliance, and Amur tiger conservation projects through the Tiger Conservation Campaign. The zoo also supports the programs of the Wildlife Conservation Society-Russia, which does on-the-ground work in Kamchatka.

Discussion:

The goal of our research was to identify the important factors in zoos' decisions about which animals to keep. Our interest in the topic was prompted by previous studies that suggested visitor preference was overly important in these decisions. We found that, at least in the case of brown bears at the Minnesota Zoo, visitor preference did factor heavily into the decision. However, visitor preference was deeply tied to other factors, especially economic constraints. Furthermore, the complexity of the process and the many actors involved defies simple statements about what factor is most important. Our takeaways are related to this complexity. They include the collaborative nature of the decision making process, the interrelatedness of the factors described in this paper, and the importance of the context of the animal selection decision.

The many layers of zoo administration worked together throughout the decision making process. The management at the zoo, the Zoo Foundation, and the Zoological Board were all involved at multiple levels of the animal selection process and often worked together. We did not find much distinction between the groups in which factors they prioritized, despite their differing roles. The members of management at the zoo were responsible for the fine details of implementing the exhibit, but the initial process of selecting animals included input from the Foundation and the board. Although the Zoo Foundation and Zoological Board had a greater responsibility for economic concerns, these certainly played into the zoo management's considerations as well. In all, we found exhibit creation to be a very collaborative process.

The exhibit creation process was collaborative; however, we found that one person had a particularly important influence on the foundational ideas behind the exhibit. Lee Ehmke, who was the president of the Minnesota Zoo from the August of 2000 until 2015, was a driving force behind the Russia's Grizzly Coast exhibit. After funding for the original Asia Gateway project was denied, it was Mr. Ehmke who proposed a northern theme instead and who suggested that the exhibit would be more impactful with bears and sea otters. Almost everyone we interviewed for this project mentioned Mr. Ehmke and his ideas. Mr. Ehmke designed many aspects of the exhibit, drawing on his background as a landscape architect. In general, the president of the zoo is in a unique position of influence, given their leadership over both the management team and the Zoo Foundation. With the support of the many other actors involved, the zoo's president has direct sway over which animals are chosen for exhibits.

Multiple people we asked about which factors were important to their role in the decision making process had difficulty putting some factors above others. Again and again, they told us that all of the factors were important. Part of their confusion seemed to stem from the interconnectedness of the factors. Considering one factor often included considerations of others. In particular, economic concerns were the underlying motivation that related to each factor. Economic concerns and visitor preference are related because the zoo has to attract people in order to make money and fund its operations. Economic concerns are related to animal welfare and the sustainability of the exhibit because both of these require expenditures. In short, the zoo's decision is shaped by how the other factors can be arranged optimally within economic constraints.

Additionally, conservation and education are deeply tied, since the main goal of education is to promote conservation. As mentioned previously, however, the effectiveness of conservation education has been questioned. In fact, a survey that the Minnesota Zoo conducted of 197 visitors to the Russia's Grizzly Coast exhibit found that only about 9% learned something about conservation and another 16% learned something about the animals' environment. We can infer from this information that although education is a

consideration, the zoo would not likely prioritize education above other factors. Actors had a difficult time trying to rank education and conservation separately since a majority of educational considerations were framed in terms of conservation.

We focused our research on how the Minnesota Zoo chose to keep brown bears in order to allow for specific analysis; however, we found that an overly narrow focus on this one decision actually prohibited a full understanding of it. The decision to keep brown bears was not made in isolation. Rather, it was part of the overall creation process of the Russia's Grizzly Coast exhibit. A holistic vision of the exhibit and the decision making process behind it was necessary to identify the important factors. For example, part of the reason the Kamchatka Peninsula was a good location to focus on was that the zoo already had Amur tigers, which is not directly connected to choosing brown bears but rather part of the broader design of the exhibit that contributed to choosing brown bears. By identifying the people and factors involved, we can see that choosing to house grizzly bears is not a single decision, rather, it fits in framework of the institution's structure and goals.

Conclusion

Ultimately, our research supports the conclusion of previous studies that visitor preference is an important consideration in selecting which animals to keep in the zoo. In particular, the inclusion of "charismatic megafauna" was considered an important strategy to attract visitors and funding. However, our findings also complicate this factor by revealing the complexity of animal selection decisions. We identified elements that are important to decision making but had not previously been widely studied, including the sustainability of the exhibit (availability of animals over time), the climate of the exhibit location, and the animals already present in the zoo. Our case study methodology allowed us to focus in on the experiences of members of the zoo administration and reconstruct the decision making environment in which they operated. An especially important aspect of this decision making environment in the interconnectedness of the factors that affected the decisions.

Limitations:

Our research was limited by time constraints, actor participation, and memory reliability. Though our project took place over the course of five months, the decision making process is filled with complexities and connections that could have been researched further with additional time. A complete examination of future research proposals will be discussed below. Our data was further constrained by the willingness of zoo employees to participate in our project. We quickly found that a majority of the decision making process went undocumented, and had to rely on participant's memories for our data. Although a state institution that requires transparency, The Minnesota Zoo was reserved in its willingness to collaborate on our project and was not accustomed to being studied as an institution. A majority of employees responded to our requests for information; however, a few were absent and a few were unreachable. This is likely due to the time of transition that was occurring at the zoo during our data collection period, while the zoo hired a new president. We were also limited by the ability of actors to recollect the steps of the decision making process. Although Russia's Grizzly Coast is a relatively new exhibit at The Minnesota Zoo, decisions surrounding its' creation occurred from 10-15 years ago. Participants struggled to construct a complete timeline of events, but most were able to remember what challenges they faced in the process and what factors were important along the way.

Suggestions for Further Research:

Our research raised a variety of questions for future study. The greatest suggestion for future research on animal selection in zoos would be to follow a decision process in real time, rather than rely on actor memory. To be present at meetings and witness the way that problems are addressed and factors are raised would allow for a far more complete study of decision making practices. Additionally, our results showed the importance of funding and its interconnectedness with every factor. The Minnesota Zoo Foundation did not respond to our surveys, creating a gap for future research in the importance of funding in animal selection and the process of lobbying and fundraising. Furthermore, our results showed the strong importance of appealing to visitors and housing entertaining and charismatic animals. Further investigation into what makes an animal charismatic, and

how we can help raise the entertainment factor for animals with strong conservation needs would also be illuminating. Our results also showed that the role of the president was instrumental in the planning, designing and collaboration on creating the Russia's Grizzly Coast Exhibit. Understanding the role of the president in other zoological institutions would help us find if this is a common trend. Another important consideration for future research would be to investigate zoos with differing administrative structures. As The Minnesota Zoo is state run, the politics of the state and the state budget largely influence how the zoo operates and is led. Looking into the decision making process in zoos that are privately owned or are non-profits would add considerable knowledge to the literature.

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Apendix:

Apendix A: Survey issued to identified actors

This survey is part of a research project being conducted by students of Carleton College for their senior thesis. You are being asked to participate in this survey because of your position with the Minnesota Zoo. The information from this survey will be used solely for this research project, which will culminate in a paper and presentation for the environmental studies department of Carleton College. The authors of this project, Kathryn Phillips and Molly Ellsworth, are happy to answer any questions you may have (you can email them at phillipsk@carleton.edu). They are being supervised by professor Kim Smith, and she can be reached as well at ksmith@carleton.edu

A description of the project:

We are environmental studies majors at Carleton College working on our senior research project, which centers on the creation of the Russia's Grizzly Coast exhibit at the Minnesota Zoo. The goal of our project is to understand how decisions are made about which animals to keep at the zoo, including who is involved in the decision making process and what factors were taken into consideration. The reason for our interest is that the zoo is an important contributor to species conservation, and we hope that by understanding the zoo's decision-making process, we can better understand the obstacles that need to be overcome to further conservation goals. In order to limit our project to a manageable scope, we are hoping to focus on the decisions surrounding the creation of the Russia's Grizzly Coast exhibit.

Thank you for agreeing to take part in our survey. We appreciate your contribution to our research project.

1) What is your job title at the Minnesota Zoo? Or, what was your job title when you worked with the zoo?

2) Were you working with the zoo during the time the Russia's Grizzly Coast exhibit was being created (between 2003 and 2008)? If not, do you know who held your position at that time?

3) If you were working with the Minnesota Zoo during the creation of the Russia's Grizzly Coast exhibit, could you give an approximate timeline of your involvement? For example, you might include when you first met with someone about the exhibit, when an important decision was made, etc.

Please answer the following questions about the creation of the Russia's Grizzly Coast exhibit. If you were not present at the zoo at that time, please answer in terms of how you were involved in a more recent decision involving animal selection.

4) Who did you collaborate with during the decision making process?

5) How did you communicate with others in the process (e.g. in meetings, over the phone, by email)?

6) What knowledge, background, or skill set did you contribute to the decision making process? Examples could include knowledge of finances, state or federal regulations, animal welfare, marketing, etc.

7) Could you describe the major milestones in your involvement in the process and how you contributed?

6) What factors were most important to **your role** in the creation of the exhibit? Below are factors that we have identified through past interviews and research. We understand that all these factors are involved in the decision process, but we would like you to describe which factors were most important to your role. Please also identify any others not included in our list. Check the boxes next to the factors that you found relevant in the process.

the educational value of the exhibit the conservation goals of the zoo animal welfare the cost of implementation appeal to visitors sustainability of the exhibit

Comments:

Please note any other factors that you found important while going through the decision making process:

7) To help us further understand your response to question 6, please rank the following factors according to how important they were to your role in the decision making process:

Educational Value	1	2	3	4	5	6	7	8	9	10
Visitor Preference	1	2	3	4	5	6	7	8	9	10
Animal Welfare	1	2	3	4	5	6	7	8	9	10
Conservation	1	2	3	4	5	6	7	8	9	10
Economic Viability	1	2	3	4	5	6	7	8	9	10
Sustainability	1	2	3	4	5	6	7	8	9	10
Other:	1	2	3	4	5	6	7	8	9	10
Other:	1	2	3	4	5	6	7	8	9	10

Other:	1	2	3	4	5	6	7	8	9	10
Other:	1	2	3	4	5	6	7	8	9	10

Comments: (List more factors and rankings if necessary)

Appendix B: Image of the Kamchatka Peninsula



Appendix C: Image of the Kamchatka Peninsula in comparison to Alaskan Aleutian Islands



Appendix D: Image of an early sketch of Russia's Grizzly Coast exhibit design



Appendix E: Zoning in the Russia's Grizzly Coast exhibit

