Public perception of conservation work by UK zoos.

From ZSL archives

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List of acronyms

BIAZA – British and Irish Association of Zoos and Aquarium

BCIS - Biodiversity Conservation Information System

CBD – Convention on Biological Diversity

Defra – Department for Environment, Food and Rural Affairs

EAZA – European Association of Zoos and Aquarium

GASPs - Global Animal Survival Plans

ISIS – International Species Information System

IUCN – International Cooperation for Conservation of Nature

WAZA – World Association of Zoos and Aquarium

WZACS – World Zoo and Aquarium Conservation Strategy

ZSL – Zoological Society of London
Abstract
Zoos have evolved their role from menageries to combating species extinction by becoming centres of conservation. It is essential to establish whether the public are interested in this role but also what they expect from zoo conservation and whether they are satisfied with current efforts. These key areas also provide a valuable insight into the visitors understanding of zoo conservation. To achieve these aims 505 visitors were interviewed at ZSL Whipsnade Zoo and Marwell Wildlife along with Tring Natural History Museum for comparison. 34 UK zoos were also surveyed to comprehend their congruence with their visitor’s perceptions. It was revealed that only a third of visitors are interested and satisfied with zoo conservation, furthermore, the majority have much greater expectations than zoos are achieving. Although on the periphery visitors appear to understand the role of zoos in conservation they do not fully understand the variety of ways in which zoos contribute. Moreover, zoos appear to be portraying the role as conservation centres but do not practice what they preach. It is crucial that zoos intensify their efforts to meet the expectations of both the zoo community and the public. Furthermore, zoos must develop innovative ways to engage the public to inspire a greater interest and enhance their understanding of zoo conservation.

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1. Introduction

1.1 Problem statement

The role of zoological gardens (hereafter zoos) in our society has evolved from being menageries to wanting to champion species protection by becoming centres of conservation. This relatively recent shift has been incorporated into numerous legislations and strategies. However, the public’s interest, expectations and satisfaction of how zoos undertake conservation has been little researched. Understanding whether the public see zoos as mere entertainment centres despite the emphasis placed by zoos on their conservation involvement would allow zoos to better communicate their achievements. It is important to understand whether the central role of zoos in conservation has trickled down to the public.

1.2 Relevance to policy and research

Zoos now contribute a significant amount of effort and skills towards conservation (WAZA, 2006). The importance of this role is highlighted through the aims and strategies of the key organisations which unite zoos and aquarium such as the European Association of Zoos and Aquarium (EAZA), and the World Association of Zoos and Aquarium (WAZA). The importance of conservation for European zoos is embedded in Article 3 of EAZA, and more globally in the World Zoo and Aquarium Conservation Strategy (WZACS) (WAZA, 2005). The role of conservation for zoos has also been incorporated into the EU member states legislation through The Zoo Directive in 2002, which allows inspection and licensing of zoos for both welfare and conservation of biodiversity (Defra, 2010). Although the effects of such strategies and legislations are incorporated within the workings of the conservation community, they too must be communicated to and supported by the public.

In a number of surveys the general public consider zoos largely as an attraction with the primary reason for visiting being ‘to have a fun day out’ (Reade and Waran, 1996; Briseno-Garzon, Anderson and Anderson, 2007; Yocco et al., 2010). Although perceived as a family fun attraction, zoos are also appreciated for their part played in education, conservation and research (Puan and Zakaria, 2007; Reade and Waran, 1996). However, the public may identify these roles merely as peripheral and not fully understand or recognise the level of involvement of zoos in conservation (WAZA, 2006). It is felt that if the public did fully
recognize the zoos’ involvement in conservation they would provide further support, which would in turn accrue more benefits for these institutions.

Zoos also promote environmental education as one of their major roles. This is because zoos argue that they have a unique opportunity to provide the public with a chance to link with nature that no other conservation organisation can (Conway, 2011; West and Dickie, 2007; Wharton, 2007). This responsibility is perceived to be ever more important owing to the loss of a connection with wildlife by the general public due to the urbanisation occurring in many parts of the world. The effectiveness of zoo education has previously been investigated, though there have been mixed results and criticisms (e.g. Balmford et al., 2007; Mallapur, Waran and Sinha 2008; Falk et al., 2007; Marino et al., 2010). Also, these studies tend to focus on the effects of a single visit to a zoo, and not the public’s general understanding of zoos and their activities.

The public’s understanding or perception of zoos and their role in education and conservation come directly from the experience of visiting zoos but also from the media. Thus, zoo visitors and also non-zoo visitors form an opinion of the role of zoos in conservation (Tian-Cole, Crompton and Willson, 2002). Measuring the public’s knowledge of zoos in conservation for the visiting and non-visiting public is therefore fundamental. However, it is also vital to understand the visitors’ interest, their expectations and satisfaction of zoo conservation. Although the public often participate in market research which includes these topics (Tian-Cole, Crompton and Willson, 2002; Tomas, Crompton and Scott, 2003), zoo conservation studies are lacking. A number of studies on the zoo visiting public have focused on visitor motivation (Packer, 2004), overall perception of the zoo (Reade and Waran, 1996; Puan and Zakaria, 2007) or even benefits of visits (Tomas, Crompton and Scott, 2003). Because people visit zoos with their own agenda and motivations aside from the zoo’s aims, understanding how to bridge the gap between zoos and their visitors remains essential (Ross and Gillespie, 2009).

This research project aimed to provide insights into the public’s knowledge of what zoos are currently doing for conservation. If the results of this study find that the public have little understanding of the role of zoos or different expectations this may suggest that
improvements need to be made on how zoos communicate to the general public on their role in species conservation.

1.3 Aims and objectives

The main aims of this study were:

- To better comprehend visitor perceptions and understanding of the conservation work carried out by zoos.
- To measure the public’s interest, expectations and satisfaction of zoo conservation.
- To assess whether there are discrepancies between perceptions of zoo conservation by visitors, non-visitors and zoo personnel.

The objectives of this study are:

- To survey zoo visitors and potential non-zoo visitors in reference to their interest, expectations, satisfaction and overall understanding of zoo conservation.
- To survey zoos about their priorities and their perception of visitor opinion.
- To quantify differences between zoo visitors, non-visitors and zoos through statistical analysis.

1.4 Overview of thesis structure

This thesis consists of six chapters. In the next chapter I present an overview of the relevant literature relating to zoos and their evolving role in conservation. I start with a brief history of zoos and how zoos have become more involved in conservation. I also analyse how the public perceive zoos and describe the study sites. The third chapter consists of the methods used in this study including details of data collection, statistical analyses and relevance to previous work. Details are given of the structure of all the questionnaires and reasons why the questions were asked. The fourth chapter provides the findings of the study. In the final chapter I explain the results of the study in a broader context and additionally discuss the application and limitations of this study. Finally, I make suggestions for further research. The references and appendices of this study can be found after chapter six.
2. Background

2.1 Brief history of Zoos

The history of zoos dates back beyond this century, with the first animal collections for public amusement being set up in ancient Egypt and China (Fa, Funk and O’Connell, 2011). The first zoos were originally just a collection of live wild animals on exhibition (menageries) for the amusement of the public. Menageries persisted until the first formal zoo was established in Vienna in 1752 (WAZA, 2006). Zoos at this time were still aimed to satisfy the public’s curiosities. However, it was not until the late 18th Century that the value of zoos as centres of scientific research was recognised (Carr and Cohen, 2011). The first scientific zoo and charity was established in 1826 in London; the Zoological Society of London (ZSL n.d. a). Furthermore, concern for the animals’ welfare and conservation of species, which are now stressed by zoos, are relatively recent developments. Interest in conservation and the role of zoos in this was a new philosophy, which only developed after the Second World War (Knowles, 2003). A common standard of practice is now provided by the World Association of Zoos and Aquarium (WAZA) to guide zoos worldwide. Zoos are said to be evolving as shown in Figure 1.

Figure 1: The history of zoos, showing the evolution of zoos from menageries and animal husbandry to centres of conservation today. From Rabb and Saunders, 2005.

2.2 Role of modern zoos

Zoos, have not only changed structurally through time they have responded to the pressures on wildlife but also to changes in cultural values (Sterling, Lee and Wood, 2007;
Broad and Smith, 2004; Knowles, 2003). Many modern zoos may have evolved from menageries to centres of conservation. However, all zoos must still provide entertainment for the public, in order to provide an income, and so must balance this with their conservation mission (West and Dickie, 2007). The majority of zoos now state their aim to be conservation and education as can be clearly seen in their mission statements (Patrick et al., 2007).

2.2.1 Education

Education is often considered as the zoo community’s primary mission (Reading and Miller, 2007; WAZA, 2006). Because zoos attract over 600 million visitors a year worldwide they are in a unique position to educate a huge volume of people and become a public face for conservation activities (WAZA, 2006; Field and Dickie, 2007). The chance to see real animals close up can evoke an emotional response, allowing people to attach values to animals, making them aware of the biodiversity crisis, as well as teaching and motivating people (Ballantyne and Packer, 2005; Gwyne, 2007; Fa, Funk and O’Connell, 2011; Rabb and Saunders, 2005). Within this mission, zoos provide an experience which is also recreational but which can inspire cognitive learning, long-term positive attitudes and behaviour change (Broad and Weiler, 1998).

Most zoos have formal education programmes for schools, aiming to connect young children to nature. Informal education to all visitors started only in the last 10-15 years (Andersen, 2003; Sterling, Lee and Wood, 2007; Ogden and Heimlich, 2009; Rabb, 1994). Informal education provides an opportunity for families to learn in a more relaxed environment, often limited elsewhere (Briseno, Anderson and Anderson, 2007). Visitors are often reluctant to read signs independently when in a family group, but there is evidence that families show cognitive learning (Briseno, Anderson and Anderson, 2007; Yocco et al., 2010; Ross and Gillespie, 2009). Some authors believe that education is more challenging when entertainment comes into play (Carr and Cohen, 2011; Sterling, Lee and Wood, 2007; Ross and Gillespie, 2009). However, education and entertainment though often seen as conflicting by zoos and academics, can be seen as complimentary by visitors (Parker, 2004; Falk, Moussouri and Coulson, 1998).
The effectiveness of zoo education is highly debated. Falk et al., (2007) presents information, though not peer-reviewed, that supports zoos as effective learning environments. Within this three-year study in American zoos, visitor’s conservation knowledge and their individual role in conservation was said to have increased during their visit. Despite the publicity this study has received it was highly criticised for reasons including demand characteristics and issues with retrospective knowledge (Marino et al., 2010). However, the evidence for and against the effectiveness of zoo education is still sparse. Mallapur, Waran and Sinha (2008) found that there was greater knowledge about the lion-tailed macaques at two zoo sites compared to a street survey in India. In contrast, Balmford et al., (2007) showed that there was only one significant response at one of five zoos in the UK, when assessing arrival and departure visitor knowledge. Because of these inconsistencies in how education effectiveness can be measured, Broad and Smiths (2004) suggested a slightly different role for zoos. They argued that instead of teaching visitors new information zoos actually reinforce prior knowledge. This may be because the public have a higher former knowledge than previously thought stemming from a variety of sources and experiences (Falk et al., 2007; Briseno-Garzon, Anderson and Anderson, 2007). The suggestion is that the media, such as nature documentaries make zoos as education centres redundant, and thus create difficulties when assessing the direct impact zoos have on the public (Wharton, 2007). Nonetheless, zoos and other information sources on wildlife can complement each other by reinforcing conservation messages (Broad and Smith, 2004).

Zoos also aim to modify the behaviour of their visitors. Previous studies have not analysed behaviour change, instead have focussed on cognitive learning (Ogden and Heimlich, 2009; Sterling, Lee and Wood, 2007). An effective education programme would be one that causes behaviour change, with visitors acting in a more environmentally-friendly manner (Sterling, Lee and Wood, 2007). This lack of research may be because behavioural change is difficult to assess in the long term. Also, an individual’s previous experiences vary, making it difficult to isolate what has caused the greatest influence.

Although education can contribute to the conservation mission of zoos, some zoos lack information about how visitors can truly contribute to conservation (Broad and Weiler, 1998). Potentially zoos feel uneasy about portraying conservation messages as these can be perceived as negative (Conway, 2003; Gwyne, 2007). This can be overcome by ensuring that
messages are not only informative but inspirational. Many zoos have now advanced to teaching students at university and in developing countries (Rabb and Saunders, 2005; Rabb, 1994) and this could be extended to informing the policy makers to help them make informed decisions (Hutchins, 2007; Conway, 2003; Hutchins and Smith, 2003; Holst and Dickie 2007, Mazur and Clarke 2001).

2.2.2 Ex-situ conservation

Ex-situ conservation (conservation outside the place of origin) in zoo terms usually relates to captive breeding. Originally, animals were bred in captivity to retain the stock in the zoo. By the early 90’s, zoos changed the reason for captive breeding to reproduce animals in captivity to maintaining threatened populations for conservation purposes (Bowkett, 2009; Baker, 2007). Alike education, this role is unique to zoos (Zimmerman and Wilkinson, 2007).

Perhaps the earliest motivation for captive breeding in zoos is embodied in what is known as the Noah’s Ark paradigm. This term describes the idea that animals can be bred in captivity until the threats in the wild are reduced, thereby acting as an insurance policy against extinction (Bowkett, 2009). Once the threats faced by the species have been removed then individuals can be reintroduced into the wild. This proposal was so strong that Global Animal Survival Plans (GASPs) were developed for high profile species. Yet, GASPs are no longer used emphasising the decline of the Noah’s Ark philosophy over the past decade (Lees and Wilcken, 2009).

Although the popularity of the Noah’s Ark paradigm has declined, breeding animals in captivity is still common in zoos. It is often considered a useful short-term tool for endangered species, especially those threatened by habitat loss (Conde et al., 2011). It can also provide a number of other conservation benefits such as research, development of technologies, conservation education and training centres (Baker, 2007). Captive breeding is considered an important tool in conservation as emphasised in the Convention on Biological Diversity (CBD) when mentioning its importance in Article 9. A number of scientific groups and tools have been established by the International Union for Conservation of Nature (IUCN) to create global networks of joint management: Conservation Breeding Specialist Group (CBSG), Species Survival Commission (SSC) and International Species Information System (ISIS) (Byers and Seal, 2003; Flesness, 2003; Knowles, 2003). These commissions
have suggested that vertebrates with wild populations of less than 100 individuals should be considered for captive breeding (Ebenhard, 1995).

The Reintroduction Specialist Group (Stanley Price and Soorae, 2003) supports the reintroduction of individuals into the wild that were bred in zoos as an instrument to restore endangered species populations (Bowkett, 2009; Stanley Price and Soorae, 2003) with zoos acting as a genetic reservoir (Baker, 2007). A number of species have benefited from reintroductions (Conde et al., 2011) such as the Przewalski horse (Van Dierendonck and Wallis de Vries, 1996). The Urocyon littoralis spp (Island Fox) have recently benefited from the expertise of the zoo community regarding captive breeding and reintroductions after the population plummeted by 95% (Coonan, Varsik and Lynch, 2010).

Reintroductions of captive animals have however been highly criticised in the literature, mostly suggesting that animals are not fit to be reintroduced into the wild due to behaviour modification in captivity (Snyder et al., 1996). Also, zoos do not currently house endangered species which would be suitable for reintroductions nor high enough numbers of individuals (Stanley Price and Fa, 2007). There is also a high failure rate in the attempts of reintroductions. However, this may only be pertinent to early practices, as they often lacked follow up monitoring and were introduced into non-native habitat (Stanley Price and Soorae, 2003). Conway (2007) expressed that although there are discouraging results from reintroduction programmes, there is an equal amount from preservation of nature.

Reintroduction programmes are now better planned and documented (Conway, 2011; Stanley Price and Soorae, 2003). This progress is vital as some regard captive breeding only worthwhile if reintroductions are viable (Ebenhard, 1995).

Captive breeding has also been much criticised. The criticisms are vast and varied from the risk of disease (Snyder et al., 1996) to the lack of involvement from local people (Conde et al., 2011). However, the criticisms mainly fall within three areas. Firstly, it is thought that captive populations are globally low and therefore are not self-sufficient or viable (Snyder et al., 1996; Baker, 2007). Secondly, those species which are part of an international breeding programme are often of a low conservation priority (Stanley Price and Soorae, 2003; Conway, 2011). Conde et al., (2011) found that only 15% of threatened species are housed in the zoo. Thirdly, it is often considered that captive breeding can be costly and may
therefore be a misallocation of essential funds (Conde et al., 2011; Fa, Funk and O’Connell, 2011). The ineffectiveness of captive breeding is sometimes so strongly felt that breeding plans are rejected by partners, for example in the case of the critically endangered Grenada Dove (Bruslund Jesen and Meier, 2008). To improve the effectiveness of captive breeding it is crucial to generate a clear strategy for prioritising species needs (Baker, 2007). Many suggest that those species which are at a critical level should be given priority, such as amphibians who are currently suffering worldwide loss due to the chytrid fungus, and there should be a higher level of planning especially with other in-situ projects (Conde et al., 2011; Lees and Wilcken, 2009; Snyder, 1996; Conway, 2003; Dickie, Hopper and West, 2007).

2.2.3 Evolving emphasis of in-situ conservation

Many zoos are committed to evolving into centres of conservation. Alike much of the natural world, zoos need to adapt to survive, to remain relevant to the current world and fulfil their obligations to society (Conway, 2003). In general, there is consensus that zoos must contribute to conservation beyond keeping stocks in captivity by helping conserve the animals in the wild that they display (Hutchins, 2003; Hutchins and Smith 2003). This means that the ultimate mission for zoos should be the conservation of endangered species (West and Dickie, 2007). To do this successfully, zoos must not only shape together their aims in ex-situ conservation but also balance their ex-situ conservation efforts with in-situ programmes (Bowkett, 2009; Dickie, Bonner and West, 2007). This focus has already started, encouraging an increase in the contributions that zoos make to in-situ conservation (Zimmermann and Wilkinson, 2007).

Even though zoos may themselves be adapting their aims to be more effective in conservation, zoos now have a legal obligation to support the conservation of species, habitat and ecosystems. As previously discussed zoos have generated their own responsibility to contribute to conservation through elements such as WZACS and The European Directive. WAZA is even trying to become recognised as a conservation organisation through branding of zoo conservation projects (Gusset and Dick, 2005) but, as of yet, zoos have not been accepted into the community of conservation organisations (Zimmerman and Wilkinson, 2007). The CBD also recognise the need for in-situ conservation alongside ex-situ conservation as identified in its Article 9. Despite having legal obligations it
is often thought that zoos conservation contributions are to curb criticism for keeping animals in captivity, with many thinking that it is superficial and only used for publicity (Gusset and Dick, 2010; Mazur and Clark, 2001; West and Dickie, 2007).

Zoos have a variety of mechanisms to contribute to in-situ conservation including scientific research, fundraising, awareness raising and provision of skills (Christie, 2007). They have expertise which can be applied to various projects (Conway, 2007), such as in the management of small populations (Kelly, 1997) and research based on genetics, reproduction and pathology (Wharton, 2007). Their experience with education can also be applied in the field (Field and Dickie, 2007), as seen with the island fox programme where zoos held an Annual Fox Festival (Coonan, Varsik and Lynch, 2010). They can also help to monitor the wildlife trade as animals are often donated to them by the public, especially those in developing countries (Cuaron, 2005). Zoos have also begun to initiate their own in-situ projects (Zimmermann and Wilkinson, 2007).

The contributions made by zoos and their impact on conservation can be difficult to assess due to the variety of projects involved (Mace et al., 2007). Recently, Gusset and Dick (2010) conducted one of the first assessments of how zoos contribute to in-situ conservation and their impact. Through the evaluation of 113 zoo projects they found that zoos are on track for building a future for wildlife. Also, just under half the projects would not have been viable without the contributions of the zoos. This contradicts previous criticisms that generations of zoos have failed to meet their ambitions (Hyson, 2004) and that most of the conservation programmes are unresponsive (Conway, 2003). This is also despite many zoos within the EU failing to meet The Directive (Fabregas, Guillen-Salazar and Garces-Narro, 2011). However, Leader-Williams et al., (2007) found that although UK zoos are not fulfilling their in-situ conservation roles there is an optimistic sign of movement towards achieving the goals.

Zoos contribution and support to conservation can also be assessed by estimating the institution’s monetary investment (Miller et al., 2004). This may be because zoos are sometimes seen as money making attractions but also because the degree of financial investment can affect the success of projects (Gusset and Dick, 2010; Miller et al., 2004). As a whole, WAZA spends $350 million a year on in-situ projects (Conde et al., 2011). However,
this issue is difficult as zoos have high running costs and can make a deficit (Puan and Zakaria, 2007). Equally, some zoos are more capable of contributing financially as they are larger or situated in developed countries (West and Dickie, 2007). One of the largest zoos, Disney, has funded more than $10 million in in-situ projects (Stevens, Odgen and Sams, 2007). It has often been stated that zoos actually contribute relatively little to conservation in both monetary and non-monetary forms (Conway, 2003; Zimmerman and Wilkinson, 2007) and has therefore been suggested that there should be guidelines of minimum contributions such as 10% of present operating income (Kelly, 1997). It is also important that zoos contribute their skills along with funds and most zoos recognise this such as the long-term relationship between Zoo Zürich and Masoala National Park who provided scientific research and community development skills along with large financial contributions (Hatchwell and Rübel, 2007; Zimmerman and Wilkinson, 2007).

There is no doubt that zoos and aquariums collectively can actively support the conservation community and can effectively help in slowing extinctions (Hutchins, 2003). However, zoos have yet to achieve this and there are countless recommendations to help them do so. Firstly, there is agreement that zoos need to intensify their efforts (Fabregas et al., 2011; Gusset and Dick, 2011). Guidelines can help identify the efforts required, ensuring that all zoos prioritise conservation (Miller et al., 2004). Secondly, there has been emphasis on habitat conservation such as creating zoo reserves which can help strengthen efforts in developing countries and can have a landscape approach (Conway, 2003; Conway, 2011; Kelly, 1997). As this is not necessarily found within zoos’ core expertise, partnerships are necessary, which is the third recommendation (Hutchins 2003; Rabb and Saunders, 2005; Millers, 2004). Partnerships can help to coordinate in-situ and ex-situ projects (Kelly, 1997) and collective planning (Conway, 2003; Smith et al., 2007). These coalitions, such as the Madagascar Fauna Group, can also extend to other organisations and governments, thereby helping to build capacity in developing countries (Durrell and Mallinson, 1998; Smith et al., 2007; Rabb, 1994; Durrell et al., 2007). These partnerships have the potential to provide great achievements to conservation based on previous relationships with cooperative breeding programmes (Field and Dickie, 2007).
2.3 Public perception and visitor experiences

People visiting informal education institutions have provided the basis for many studies within the field of zoo biology and visitor studies. This research has analysed the public perception of the role of zoos, motivations for visiting and the effect of personal agendas on learning. As the public provide key financial support to zoos, some authors argue that to succeed in conservation it is crucial to understand the public’s relation to animals (Rabb and Saunders, 2005). This can help to provide a more effective education programme and ensure public support (Tomas, Crompton and Scott, 2003).

The overall perception by the public of the role of zoos has been studied in a number of countries. As the role of zoos has changed throughout time it is assumed that the public’s perception has too. Despite the traditional role of zoos as recreational centres, current perception of zoos now also includes conservation, research and education, with conservation being considered the most important (Reade and Waran, 1996; Puan and Zakaria, 2007; Falk et al., 2007). This view is not only prevalent among zoo visitors but is also extended to the general public as Reade and Waran (1996) found in a street survey in Edinburgh. However, this study involved a lengthy questionnaire which could have caused demand characteristics, despite this it is still an interesting finding. The general public’s perception of zoos cannot only be influenced by previous visits but also by the media. A zoo’s website is an interesting way to decipher how zoos portray themselves. Carr and Cohen (2011) analysed 54 zoo websites worldwide and found that despite the emerging role of zoos as centres for conservation, entertainment was still the dominant role presented. This can confuse visitors, providing mixed messages about the role of zoos (Hyson, 2004).

The role of zoos in the media is predominantly depicted as entertainment, after all zoos need to ensure that they attract visitors. Despite the public understanding that zoos can be centres of conservation, the top motivation for visiting a zoo is still for recreational purposes (Puan and Zakaria, 2007; Reade and Waran, 1996) and a time to spend with family members (Yocco et al., 2010; Briseno-Garzon, Anderson and Anderson, 2007; Tomas, Crompton and Scott, 2003). Although some of these studies have low sample sizes (e.g. Briseno-Garzon, Anderson and Anderson, 2007) they are given credibility due to the number of supporting
studies. Further benefits are also sought from informal education centres such as restoration, relaxation and education (Tomas, Crompton and Scott 2003; Packer, 2008).

Education is another common role which the public recognise as important in zoos influencing their decision to visit. Packer (2004) studied six different educational leisure settings in Australia and found that people do seek education from these institutions and further highlighted that there was a slight difference between museums and aquariums, in that visitors to the aquarium rated enjoyment as a higher priority (Packer and Ballantyne, 2002). This suggests that caution must be taken when applying museum studies to zoos. Museum visitor studies have also emphasised the importance of personal agendas as they can influence the learning experience (Falk, Mousouri and Coulson, 1998). It would be considered that zoo education would be of a high performance as it is a priority for zoos and a motivational factor for visitors. However, a visitor satisfaction study of 606 visitors found that it was of low performance (Tomas, Crompton and Scott, 2003). This again reiterates the need for visitor studies to be carried out, to not only discover their understanding but their satisfaction with the zoo’s performance. Moreover, the quality of service is also thought to affect the efficiency of education and behavioural intentions (Tian-Cole, Crompton and Willson, 2002).

It is reassuring to discover that the public prioritise the role of conservation in zoos above education and entertainment. However, this does not explain the extent of the public’s understanding of how zoos contribute to conservation. Puan and Zakaria (2007) revealed in a study in Peninsular Malaysia that despite the public recognising the role of zoos in conservation only 29% of interviewees were aware of animal reintroductions. Furthermore, 94% thought that animals were kept in zoos for recreational purposes. This study also included 20% of non-residents to the state which may have been influenced by the zoos of their home country and therefore may not be representative of Malaysian zoo perceptions. Other studies are lacking in detail with respect to the public perception of zoo conservation. Questions usually consist of what visitors think the primary role of a zoo is and do not delve any deeper into the public’s understanding.
2.4 Study sites

I conducted a visitor survey at two BIAZA zoos: Zoological Society of London (ZSL) Whipsnade Zoo, and Marwell Wildlife and a non-zoo attraction, The Tring Natural History Museum. The zoos were chosen for the following reasons:

- Known important contribution to conservation, measured through monetary contributions to *in-situ* projects.
- High visitor numbers.
- Location (easily accessible).

Data to measure the contribution to conservation and visitor numbers was made available by BIAZA (M. Stevenson, pers. comm.).

The first study site was ZSL Whipsnade Zoo (hereafter Whipsnade). ZSL is a charity with the mission “to promote and achieve the worldwide conservation of animals and their habitats” (ZSL n.d. b). This charity incorporates two zoological gardens, London and Whipsnade, as well as the Institute of Zoology and the Conservation programmes department. It has a rich history of combining the zoos with conservation work which can be seen through the history of ZSL. This charity was founded in 1826 with London Zoo opening in 1828 and was coined the ‘world’s first scientific zoo’. Whipsnade was formed just over a 100 years later in 1931. Whipsnade is the largest zoo in the UK with 260 hectares of land situated in Bedfordshire. It has a large number of species as well as visitor numbers; 213 and 475,036 respectively (as of 2009, International Zoo Yearbook, 2011). Today, ZSL’s strategic aims still emphasise their role in conservation. This involves research, influencing policy change, motivating stakeholders, implementing both *in-situ* and *ex-situ* conservation programmes and generating funds (ZSL n.d. b).

The second study site was Marwell Wildlife (hereafter Marwell), a 40 hectare zoo situated in Hampshire. Again, this is a registered charity ‘dedicated to the conservation of biodiversity and other natural resources’ (Marwell Wildlife n.d. a). Their commitment to conservation is expressed through their aims to conserve species and their habitats locally and globally, inspire care, undertake scientific studies and the improvement of their environmental performance (Marwell Wildlife n.d. a). Marwell, originally Marwell Preservation Trust, was
established in 1972 to breed and conserve endangered species (Marwell Wildlife n.d. b). Marwell also has a significant number of species and attracts many visitors: 236 and 506,000 (International Zoo Yearbook, 2011).

The Tring Natural History Museum (hereafter Tring) was the third study site acting as a comparison to the zoos. Tring is situated in Hertfordshire but is part of the London Natural History Museum. The museum’s taxidermy collections were originally privately owned by Lionel Walter who became the founder of Tring. The museum was then officially opened to the public in 1937 (Natural History Museum n.d. a). Throughout the history of this museum new specimens have been received and recorded which have contributed to the scientific research conducted at Tring (Natural History Museum n.d. b).
3. Methods

Questionnaires are considered a useful research tool and have routinely been used in this field for a number of purposes including motivation studies (e.g. Puan and Zakaria 2007; Packer and Ballantyne 2002) and learning (e.g. Balmford et al., 2007; Falk et al., 2007). In this study, I developed three questionnaires to apply to visitors at all three study sites and the zoos themselves. The first was a visitor survey developed to understand visitor’s perception of the role of zoos in conservation. The second questionnaire, similar to the first, was applied to visitors at Tring. Finally, a third questionnaire aimed at the zoos themselves was used to measure their understanding of their visitors and their perceptions. The results from the surveys allowed the congruence of zoos and their visitors to be assessed.

3.1 Data collection

Visitors at Whipsnade and Marwell were interviewed between May 21\textsuperscript{st} 2011 and 14\textsuperscript{th} June 2011, with one full week at each zoo. On days of heavy rain, surveys were postponed to the same day of the week later in the month. Visitors were interviewed as they departed the zoo between 12pm-6pm. The decision to survey visitors on their departure was made to ensure that visitors had had a chance to be informed about zoo conservation. When surveying, the visitors were approached at random and were given a preamble of the study. Only visitors who were over 18 and UK residents were used in this study. The questionnaire was spoken and shown to the visitors to ensure that the questions were understood and completed fully. Interviews lasted between 5-8 minutes. Interviews at Tring took place between 23\textsuperscript{rd} and 29\textsuperscript{th} June 2011 from 10am to 5pm.

The zoo questionnaire was a short survey consisting of five questions. It was emailed to 65 BIAZA institutions that were then given seven weeks to reply. Education officers were primarily emailed, however, in cases where there was no such role the marketing department or manager was emailed instead. The emails contained a short introduction to the project, a covering letter and a BIAZA support letter. A total of 34 questionnaires were returned; a response rate of 52%.
3.2 Zoo visitors survey

The majority of questions in the zoo visitor interviews consisted of closed questions with an option for ‘other’ and ‘don’t know’. Two questions were open to the visitors to answer freely and later categorised. The questionnaire can be found in Appendix 1.

3.2.1 Demographics

The first section of the questionnaire aimed to gather information on the demographics of the visitors. These questions have been routinely used in other questionnaires to understand the background of the participants and to assess which proportions of the public are being surveyed (e.g. Reade and Waran, 1996). Visitors were asked whether they were UK residents, their age, sex, highest education level, group composition and occupation.

3.2.2 Interest in conservation and conservation work by zoos

A number of questions were asked to assess the public’s interest in conservation and zoo conservation in particular. The public were asked about their interest in conservation from a scale of very interested to very uninterested. Whether they actually had an active interest in conservation was then measured by two questions, whether they were a member of any conservation organisations and whether they contributed to conservation themselves in any way. Visitor contributions were later categorised into ‘active’ (e.g. reduced car use and volunteering) and ‘passive’ (recycling). Similar questions have been used previously to measure the public’s interest in conservation by Balmford et al. (2007).

The visitor’s interest in zoo conservation was measured by five questions. Firstly, visitors were asked how many times they had visited a UK zoo in the last year excluding this visit and whether they were a member of any zoo. The second question assessed their interest and awareness by asking them to list up to four ways of how zoos can contribute to conservation. This was later categorised into ‘no’, ‘yes – breeding’ and the number of other methods mentioned. The visitors were also asked if they could name a species which zoos have helped save from extinction. This open-ended question was later categorised into frequent answers such as tiger, charismatic species and non-charismatic species. Due to the extensive number of projects undertaken by zoos across the world it was difficult to categorise species that zoos had contributed to saving them from extinction. A similar
question was later asked about whether they were aware of any projects at the study zoo, and if yes they were then asked to state the animal/area involved. The factors which influenced the visitors to visit the study site were also asked from a list of the following eight options:

- Price
- To learn about animals
- To support the conservation work carried out by the zoo
- The zoo has a good reputation
- For a fun day out
- Location of the zoo
- The zoo’s animal collection
- The zoo’s welfare standards e.g. enclosure size

The motivation of zoo visitors has previously been assessed by studies such as Yocco et al., (2010). However, options given for the visitors to answer have been limited usually to one. Therefore, by asking the visitors to rank their top four reasons for visiting the zoo this can reveal the importance of ‘supporting conservation work’ for the visitor. The final question simply asked the visitors to state how informed they feel about zoo conservation. The knowledge based questions were also a key reflection of the visitor’s understanding of the role of zoos in conservation.

3.2.3 Expectations of conservation work by zoos

The zoo visitors were asked four questions to assess their expectations and aspirations for zoos, with regards to the contribution made by zoos to conservation. Visitors were first simply asked in an open-ended question whether they expected zoos to contribute to conservation and why. A ranking question was then used to understand which priorities the visitors thought zoos should have from the following options:

- Caring for animals in the zoo
- Educating the public about conservation issues such as threatened species
- Breeding all animals in the zoo regardless of whether they are endangered in the wild
• Breeding endangered animals in the zoo
• Providing a fun day out for the public
• Reintroducing endangered animals into the wild that were bred in zoos
• Carrying out and supporting conservation projects outside of the zoo to conserve wild animals
• Donations to conservation organisations/projects
• Providing expert training for staff/keepers and conservationists
• Scientific research
• Other

This question was repeated later in the questionnaire in respect to their perceptions of zoos and in the zoo questionnaire in order to make multiple comparisons. Visitors were also asked what percentage of the annual income they expected zoos to contribute to conservation. The last question in this section was an open-ended question about the area of conservation they would like to see zoos focus on.

3.2.4 Satisfaction with conservation work by zoos

Two questions assessed the satisfaction with zoo conservation by the public. The first question asked in a straight-forward manner whether the interviewee was satisfied with zoo conservation by recording it in a scale from very satisfied to very unsatisfied. The answer also included ‘don’t know enough about conservation work’ and ‘don’t know my opinion’. This was important to further show the visitors understanding of zoo conservation. The last question asked whether the public perceived there to be a difference between their priorities for zoos and the zoo’s actual priorities. If the visitor agreed they were asked to rank the same options in relation to the zoo’s priorities.

3.3 Survey to potential non-zoo visitors

Tring was selected to act as a comparison to the zoo sites providing the potential to assess whether non-zoo visitors were similar to visitors. The survey to non-zoo visitors at Tring was very similar to the zoo-visitor questionnaire and can be found in appendix 2. Two questions were removed which related to a day at the zoo. Two questions were added, whether they had considered visiting a zoo today and why they decided not to visit a zoo. The second
question was provided with choices similar to those from Hopper (1999) with the addition of ‘zoos do not contribute to conservation and ‘price’.

3.4 Survey to BIAZA zoos

The zoos were asked four questions and were also given the option to request a copy of the abstract or full results of this study. The zoo and the position of the person filling in the questionnaire were recorded. The question followed a similar structure to the visitor’s survey to allow direct comparisons. The full questionnaire can be found in appendix 3.

The first section of the questionnaire focused on the zoo’s priorities and focus areas. The zoos were first asked to rank their top four priorities from the same list of nine options as the visitors. The zoos were then asked an open ended question of what area of conservation they focus on. The second part of the questionnaire focused on the zoos understanding of their visitors. The zoos were asked to rank the same options of the previous question but from the visitor’s perspective. They were then asked whether they thought that the visitors would be aware of the conservation projects carried out at their zoo. Asking the zoos to rank both their priorities and zoos priorities from the visitor’s perspective enabled multiple comparisons (Table 1) with the visitor questionnaire and will reveal whether zoos are synchronised with their visitors and visitor understanding of zoo conservation.

Table 1: Multiple comparisons between the ranked priorities questions from both the zoo questionnaire and visitor questionnaires and what they portray.

<table>
<thead>
<tr>
<th>Visitor priorities</th>
<th>Zoos priorities</th>
<th>Visitor’s perceived zoo priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruence of priorities</td>
<td>Zoos understanding of their visitors</td>
<td></td>
</tr>
<tr>
<td>Visitor understanding of zoos priorities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.5 Pilot study

Both questionnaires were piloted to non-random members of the public. Both questionnaires were also reviewed by BIAZA and the participating visitor sites. The visitor questionnaire went under rigorous review with many versions trialled, after each review the questionnaire was trialled again. After the first review of the visitor questionnaire the
language was altered to ensure that all the terms were understood and the questions were clear. Conscious of the length of the questionnaire, a number of questions were removed after the second trial. The time the questionnaire took was kept to a minimum to ensure that visitors answered questions honestly and did not feel pressurised by the time.

3.6 Data analysis

Initially, basic statistics were used to explore the data such as frequency distributions, medians and percentages in Excel. A number of statistical tests were then used to further analyse the data in R. Non-parametric tests were used due to the nature of survey data. Kruskal-Wallis tests were used to determine whether there were any differences in the responses between the sites. This test was used for both differences in each question and also the priorities questions. This test is suitable for these data as it is non-parametric, allowing for unequal sample sizes and reducing the chance of error rather than using multiple Mann-Whitney U tests. However, there is no credible post-hoc test for Kruskal-Wallis, therefore the relationships between the data were interpreted from the graphs. A Mann-Whitney U test was used to measure the difference between Whipsnade and Marwell for the visit specific questions (conservation projects and influential factors of visiting the zoo). A point system was developed to analyse the ranking questions (zoo/visitor priorities and influential factors). This point system designated the highest ranked answer a score of 1 and the lowest rank (0) the score of 5. Therefore, the factor with the lowest points is the highest priority. A Wilcoxon matched pairs test was used to understand whether there was a significant difference between the zoo’s priorities and the perceived visitor priorities. Other statistical tests such as Chi Squared tests and generalised linear models were investigated but were deemed unsuitable to use.
4. Results

4.1 Visitor questionnaire

In total, 505 questionnaires were collected; the details of sample sizes at each site and response rate are given in Table 2. A total sample of 349 interviews from Whipsnade and Marwell were applied during the study. A further 156 interviews were conducted at Tring acting as a comparison. Similar results are found at individual each site unless otherwise discussed. All percentages are rounded up to the nearest figure. Examples of the codes used in R for the analysis can be found in Appendix 5.

Table 2: Sample size and response rate at the three study sites: ZSL Whipsnade Zoo, Marwell Wildlife and Tring Natural History Museum.

<table>
<thead>
<tr>
<th>Study Site</th>
<th>Sample Size</th>
<th>Response rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whipsnade</td>
<td>168</td>
<td>76</td>
</tr>
<tr>
<td>Marwell</td>
<td>181</td>
<td>81</td>
</tr>
<tr>
<td>Tring</td>
<td>156</td>
<td>86</td>
</tr>
</tbody>
</table>

4.1.1 Demographics

For the three sites, 65% were women and 35% men. Most respondents were aged between 30-39 years old, representing 33% of the sample. Only 11% of respondents were aged 50-59 years old. Most interviewees came in family groups (66%) and only a low proportion came on their own (3%). Over a third of respondents had received education to a degree level (34%), closely followed by College/A-level education (31%). Over half of interviewees were in full-time employment (53%). Demographics at each site is shown in Table 10 of Appendix 4.

4.1.2 Interest in conservation and zoo conservation

A small proportion of zoo visitors were members of conservation organisations (16%), with a slightly higher percentage at Tring (22%). However, more than three quarters (86%) of zoo visitors expressed an interest in nature conservation, with 29% reporting to be ‘very interested’. The remaining visitors were “neutral” and only two interviewees reported to be ‘disinterested’. Only 4% of zoo visitors do not contribute to conservation, slightly higher at Tring (10%). The majority of interviewed visitors were only passively contributing by
engaging in activities such as recycling (68%). A further 28% of visitors actively contributed to ‘green’ activities, for example reducing their car use or volunteering. A Kruskal-Wallis test showed there were no significant differences in conservation interest between the sites.

For the sample of zoo visitors, zoo membership (39%) was considerably higher than membership of conservation organisations and only 6% of zoo members were also members of conservation organisations. Zoo membership for visitors at Tring was lower (13%) than for zoo visitors. A Kruskal-Wallis test revealed that there was a significant difference in zoo membership at the three sites (df=2, $\chi^2=234.6573, p=<0.001$). The majority of zoo visitors had visited a zoo one to three times in the last year (36%) though there was significant variation between the sites seen in Fig. 2 (Kruskal-Wallis, 2, $\chi^2=18.4326, p=<0.01$), with Tring visitors visiting zoos less than the zoo visitors.

![Figure 2: Percentage of visits to a zoo in the last year from visitors at Tring Natural History Museum and the two zoo sites. Data was collated from ZSL Whipsnade Zoo and Marwell Wildlife to produce the zoo percentages.](image)

Visitors were asked how informed they felt about zoo conservation. Almost half of the respondents felt ‘informed’ (44%). There was slight variation in the response ‘uninformed’ with a higher response at Tring (26%) and Whipsnade (18%) than Marwell (14%) (Fig. 3).
Also, more people felt informed at Marwell (49%) than both Tring (38%) and Whipsnade (38%). A Kruskal-Wallis test revealed that there was a significant difference between the three sites ($df=2$, $\chi^2=15.1344$, $p<=0.01$).

Figure 3: How informed visitors felt about zoo conservation at all three sites: ZSL Whipsnade Zoo, Marwell Wildlife, Tring Natural History Museum and the zoo data collated.

Visitor’s knowledge also acted as a proxy for zoo conservation interest. A total of 35% of all zoo visitors did not know how zoos contribute to conservation. The majority of respondents who could name a conservation method used by zoos mentioned breeding (Fig. 4). Only 3% of zoo visitors could name four methods. There was no significant variation between sites as revealed through a Kruskal-Wallis test.
When asked to name an animal that zoos have help saved from extinction the majority of zoo visitors named a charismatic species (64%) and only 8% mentioned non-charismatic species. Among the charismatic species, the tiger was mentioned the highest number of times (22%). Other animals named were the giant panda (5%) and rhino (4%). Just under a quarter of the visitors could not name a species (23%) and 4% said “a lot of animals”. Despite the range of answers given in response to this question, there was no significant difference between the three sites. When asked to name any conservation project at the study zoos the majority could not name any projects (67%), with 15% insisting that they have “heard of the projects but can’t name them”. Just over one fifth named a conservation project correctly (22%) and 6% wrongly named a project. Common answers at the zoos included new projects which were advertised, including tigers at Whipsnade (6%) and cheetahs at Marwell (6%). A Mann-Whitney U test indicated a significant difference between the two sites (W=13144, p=<0.05).

Zoo visitors were also asked what four factors, from a list of eight, influenced them in coming to the zoo. The point system revealed that the most motivational factor was ‘To
have a fun day out’ as it had the lowest score. Seven results were omitted from Marwell as they visited for “other” reasons, usually exercise. The factors are ranked by the zoo visitors as follows:

1. To have a fun day out
2. Location of the zoo
3. Zoos animal collection
4. To learn about animals
5. Good reputation
6. Animal welfare standards
7. To support conservation work
8. Price

There was a difference between the rankings at the zoos (Fig. 5). More visitors said they visited the zoo to learn about animals than the zoos animal collection at Marwell. Visitors at Marwell were slightly more influenced by ‘support conservation work’ (6th) than Whipsnade visitors (8th), however this was not significant. In total, 72% of the zoo visitors did not rank ‘to support conservation work’ in their top four influential factors. The only significant difference between factors that influenced visitors to visit the zoo between the two sites was the zoo’s animal collection (Mann-Whitney U, W=11394.5, P=<0.001).
Visitors at Tring were asked two additional questions. Over three quarters of the visitors had not considered visiting a zoo that day (78%) and the majority (44%) reported that it was for ‘other’ reasons, largely bad weather. A quarter of the visitors did not have enough time to visit a zoo (23%) and 8% had been enough times recently. A small proportion (4%) of visitors disapproved of any animals in captivity, 1% disapproved of animals in captivity that aren’t endangered and 2% thought that animals were poorly maintained in zoos and as a result did not visit. Around 12% considered zoos to be too expensive and 5% thought that zoos were aimed at children. No one answered that they were not interested in animals, that there were too few active/social species or that zoos do not contribute to conservation.

4.1.3 Visitor expectations of zoo conservation

The majority of visitors expected zoos to contribute to conservation (91%) for a variety of reasons (Fig. 6). Most answers involved the issue of captivity such as “as they have animals in captivity they should conserve animals in the wild” (25%). The reason “its part of the zoo” was a close second at 23%. There was a slight difference between the three sites with the reason “everyone should” solely found at Whipsnade. The differences were not significant.
Figure 6: Whether zoo visitors from ZSL Whipsnade Zoo and Marwell Wildlife expect zoos to contribute to conservation with corresponding percentages. All other categories except “No” and “Don’t know” do expect zoos to contribute to conservation and their reason why is provided. Total sample size is 349 zoo visitors.

Visitors were asked what percentage of the zoos annual income they expected zoos to contribute to conservation outside of the zoo. The majority of respondents did not know what they expected (23%) and the second most common answer was 20-29% (20%). Only 3% of visitors answered “whatever the zoo can afford” and so this category was added. There was variation between the answers provided at the two zoos as shown in Fig. 7. A greater proportion of visitors at Marwell did not know what they expected than Whipsnade; however these were not significantly different.
Figure 7: Visitor expectations of the percentage of zoos annual income to be contributed to conservation projects outside of the zoo. To show the variation in the responses, data are presented from ZSL Whipsnade Zoo and Marwell Wildlife both separately and collated. The data is ordered in descending order from the zoo collated data, with most of the visitors answering “Do not know”.

The third expectation question was the area of conservation that visitors would like zoos to focus on. The top three answers from zoo visitors were endangered species (38%), don’t mind (36%) and habitat (15%) (Fig. 8). There were no significant differences between sites.

Figure 8: Area of conservation that visitors expect zoos to focus on. Data is collated from ZSL Whipsnade Zoo and Marwell Wildlife, n=349.
The last area of visitor expectations was their priorities for zoos. The point system revealed that overall priorities of zoo visitors are ranked in the following order:

1. Caring for animals in the zoo
2. Educating the public about conservation issues
3. Reintroducing endangered species that were bred in zoos
4. Carrying out and supporting conservation projects outside of the zoo
5. Breeding endangered animals
6. Breeding all animals
7. Providing a fun day out for the public
8. Training staff/keepers and conservationists
9. Donations to conservation projects
10. Scientific research
11. Other

There were slight differences between sites (Fig. 9). Priorities 1-4 are clear whilst the remaining ranks are similar. The two zoos differed slightly in their third priority, with Marwell visitors prioritising reintroduction over conservation projects (reintroduction: Marwell=3.48, Whipsnade=3.84, conservation projects: Marwell=3.81, Whipsnade=3.81). Visitors at Marwell also prioritised donations to conservation projects higher than training (donations: Marwell=4.59 Whipsnade=4.75, training: Marwell=4.62, Whipsnade=4.51). There was only one difference in ranks when comparing Tring with the two zoos. Tring visitors prioritised scientific research higher than donations to conservation projects (donations: Tring=4.49, Zoos=4.67, scientific research: Tring=4.58, Zoos=4.7).
4.1.4 Satisfaction with zoo conservation

Three questions assessed visitors’ satisfaction with UK zoos contributions to conservation. The first question was a satisfaction scale. The majority of the respondents thought that they “didn’t know enough about zoo conservation work” (58%) to answer whether they were satisfied or not. Some visitors did feel satisfied with zoo conservation, with 7% feeling very satisfied and 30% satisfied. However, 4% felt neutral and 2% didn’t know their opinion.

Visitor satisfaction was also measured by asking visitors if they thought that the zoos priorities altered to their priorities previously given. The majority of the visitors thought that their priorities and the zoos were the same (41%), closely followed by “Don’t know” (40%). Finally, 19% of zoo visitors thought that there was a difference between their priorities and zoos priorities. There was no significant difference between the sites. The perceived zoo priorities were then calculated from visitors except those who responded “don’t know”. The zoo visitors perceived zoo priorities were overall ranked in the following order using the point system:
1. Caring for animals in the zoo
2. Educating the public about conservation issues
3. Reintroducing endangered animals
4. Carrying out and supporting conservation projects
5. Breeding all animals in the zoo regardless of whether they are endangered
6. Providing a fun day out for the public
7. Breeding endangered animals in the zoo
8. Training staff/keepers and conservationists
9. Scientific research
10. Donations to conservation organisations
11. Other

Despite nearly a fifth of the zoo visitors perceiving there to be a difference between their priorities and zoo priorities the point system reveals that there are only a few differences. The first four priorities of both the visitor’s and the perceived zoo’s priorities were the same. However, visitors perceive zoos to prioritise breeding all animals in the zoo instead of endangered species. Furthermore, visitors think that zoos highly prioritise providing a fun day out more than visitors actually do. Lastly, the zoo visitors perceived zoos to prioritise scientific research over donations to conservation projects. With 40% of visitors not knowing what zoos priorities were this caused a difference in sample size meaning that a statistical test could not be carried out. There were slight differences between the sites as can be seen in Fig. 10. Whipsnade visitors ranked zoos priorities as carrying out and supporting conservation projects 3rd, breeding all animals in the zoo 4th and reintroducing animals 5th. The priorities from Tring differed considerably to those of zoo visitors. The differences are as follows: providing a fun day out 3rd, reintroducing animals, 5th training keepers, staff and conservationists, 6th breeding all animals in the zoo, 7th carrying out and supporting conservation projects and 8th breeding endangered animals in the zoo. There were differences when solely looking at visitors who perceived there to be a difference between their priorities and zoos priorities. Their top four priorities still included caring for the animals and educating the public but the 2nd priority was providing a fun day out and fourth priority training staff/conservationists. They also perceived zoos to prioritise breeding
all animals in the zoo over in-situ conservation and lowered the ranking of reintroducing animals.

Figure 10: Visitor’s perception of zoo’s priorities. This data was collected from ZSL Whipsnade Zoo, Marwell Wildlife and Tring Natural History Museum. The visitors that replied “Don’t know” to whether they perceived zoo’s priorities to be different from their own were not included. The average point score was calculated from the point system generated, where the lowest point score is the most prioritised option.

4.2 Congruence between zoos and their visitors

4.2.1 Zoo visitor’s priorities and zoo’s priorities

By asking both zoo visitors and the zoos themselves about their priorities in zoo conservation it was possible to assess congruence between these two groups. Priorities for zoos and their visitors are clearly different (Table 3). The first two priorities are the same but major differences can be found in the other rankings, the greatest being ‘providing a fun day out’ and ‘reintroducing animals into the wild that were bred in zoos’. Zoos highly prioritise providing a fun day out (zoos=3.97, visitors=4.47) more than visitors. Reintroducing animals is the visitors 3rd priority whilst it is the zoos 7th (visitors=3.66, zoos=4.68). Visitors also prioritised in-situ conservation action higher than zoos, with reintroduction 3rd and carrying out conservation projects 4th, whilst zoos prioritise these 7th and 5th respectively.
Table 3: Zoo visitor’s and zoo’s priorities for zoos. The zoo visitor priorities come from a sample of 349 visitors at ZSL Whipsnade Zoo and Marwell Wildlife. The zoos priorities come from a sample of 34 zoos in the UK. The ranking was calculated from a point system where the highest priority was given 1 point and the lowest priority 5.

<table>
<thead>
<tr>
<th>Priorities</th>
<th>Zoo visitors</th>
<th>Zoos</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Caring for animals in the zoo</td>
<td>Caring for animals in the zoo</td>
</tr>
<tr>
<td>2</td>
<td>Educating the public about conservation issues</td>
<td>Educating the public about conservation issues</td>
</tr>
<tr>
<td>3</td>
<td>Reintroducing animals into the wild that were bred in zoos</td>
<td>Breeding endangered animals</td>
</tr>
<tr>
<td>4</td>
<td>Carrying out and supporting conservation projects outside of the zoo</td>
<td>Providing a fun day out</td>
</tr>
<tr>
<td>5</td>
<td>Breeding endangered animals</td>
<td>Carrying out and supporting conservation projects outside of the zoo</td>
</tr>
<tr>
<td>6</td>
<td>Breeding all animals regardless of whether they are endangered</td>
<td>Breeding all animals regardless of whether they are endangered</td>
</tr>
<tr>
<td>7</td>
<td>Providing a fun day out</td>
<td>Reintroducing animals into the wild that were bred in zoos</td>
</tr>
<tr>
<td>8</td>
<td>Training keepers/staff/conservationists</td>
<td>Donations to conservation projects</td>
</tr>
<tr>
<td>9</td>
<td>Donations to conservation projects</td>
<td>Scientific research</td>
</tr>
<tr>
<td>10</td>
<td>Scientific research</td>
<td>Training keepers/staff/conservationists</td>
</tr>
<tr>
<td>11</td>
<td>Other</td>
<td>Other</td>
</tr>
</tbody>
</table>

There were a number of significant differences between the four sets of priorities, as tested with Kruskal-Wallis (Table 4). As the visitor’s priorities at the three sites were similar, the differences are expected to lie between the visitor’s priorities and the zoos priorities.

Table 4: Differences between visitor’s priorities and zoo’s priorities. A Kruskal-Wallis test was used to analyse the difference between the three visitor sites; ZSL Whipsnade Zoo (n=168), Marwell Wildlife (n=181) and Tring Natural History Museum (n=156), and the zoos themselves (n=34). The p values are as follows: *0.05, **0.01, ***0.001, NS = Not significant. The degrees of freedom = 3.

<table>
<thead>
<tr>
<th>Priorities</th>
<th>$X^2$ Stat</th>
<th>Significance value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caring for animals in the zoo</td>
<td>9.3215</td>
<td>0.02531</td>
<td>*</td>
</tr>
<tr>
<td>Educating the public about conservation issues</td>
<td>0.4222</td>
<td>0.9356</td>
<td>NS</td>
</tr>
<tr>
<td>Breeding all animals regardless of whether they are endangered</td>
<td>0.3663</td>
<td>0.9471</td>
<td>NS</td>
</tr>
<tr>
<td>Breeding endangered animals</td>
<td>4.4577</td>
<td>0.2161</td>
<td>NS</td>
</tr>
<tr>
<td>Providing a fun day out for the public</td>
<td>47.1979</td>
<td>3.16E-10</td>
<td>***</td>
</tr>
<tr>
<td>Reintroducing animals into the wild that were bred in zoos</td>
<td>13.5049</td>
<td>0.00366</td>
<td>*</td>
</tr>
<tr>
<td>Carrying out and supporting conservation projects outside of the zoo</td>
<td>13.3032</td>
<td>0.00403</td>
<td>**</td>
</tr>
<tr>
<td>Training keepers/staff/conservationists</td>
<td>8.7245</td>
<td>0.03319</td>
<td>*</td>
</tr>
<tr>
<td>Donations to conservation projects</td>
<td>4.0292</td>
<td>0.2583</td>
<td>NS</td>
</tr>
<tr>
<td>Scientific Research</td>
<td>8.586</td>
<td>0.3561</td>
<td>*</td>
</tr>
<tr>
<td>Other</td>
<td>0.6376</td>
<td>0.8878</td>
<td>NS</td>
</tr>
</tbody>
</table>
4.2.2 Zoo priorities from both the zoo and visitor perspective

Comparisons can also be made between zoo’s priorities and what the visitor’s perceive zoos priorities to be (Fig. 11). Priorities for reintroducing animals and carrying out and supporting conservation work were similar as seen in Fig. 10. Visitors believed that zoos prioritised scientific research over donations to conservation organisations which is correct. Visitors rightly identified that zoos would prioritise providing a fun day out higher than visitors do (6th opposed to 3rd).

![Figure 11: Zoo’s priorities from the perspective of both zoos and zoo visitors. The zoo’s priorities were collected from 34 zoos in the UK and the zoo visitor data collated from 349 visitors at ZSL Whipsnade Zoo and Marwell Wildlife. A point system was used to calculate the ranks where the highest priority was given the score of one; therefore the lowest average point score is the most prioritised option.](image)

There are a number of significant differences between the visitor’s perception of zoo’s priorities at the three visitor sites and the zoo’s actual priorities (Table 5). The significant differences are expected to lie between the zoos priorities and visitors perceptions. Due to the differences between Tring and zoos (Fig. 10) a significant difference is also expected.
Table 5: Differences between zoo priorities and the visitor perception of zoo priorities. The data is from three separate visitor sites: ZSL Whipsnade Zoo, Marwell Wildlife and Tring Natural History Museum. Data from 34 zoos in the UK is also included. A Kruskal-wallis test was used to look at the variation between the four sets of data. The degrees of freedom is 3. The p values are as follows: *0.05, **0.01, ***0.001, NS means Not Significant.

<table>
<thead>
<tr>
<th>Priorities</th>
<th>$\chi^2$ Stat</th>
<th>Significance value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caring for animals in the zoo</td>
<td>15.0766</td>
<td>0.001752</td>
<td>**</td>
</tr>
<tr>
<td>Educating the public about conservation issues</td>
<td>15.0312</td>
<td>0.00179</td>
<td>**</td>
</tr>
<tr>
<td>Breeding all animals regardless of whether they are endangered</td>
<td>3.2124</td>
<td>0.36</td>
<td>NS</td>
</tr>
<tr>
<td>Breeding endangered animals</td>
<td>11.9853</td>
<td>0.007434</td>
<td>**</td>
</tr>
<tr>
<td>Providing a fun day out for the public</td>
<td>8.2705</td>
<td>0.04074</td>
<td>*</td>
</tr>
<tr>
<td>Reintroducing animals into the wild that were bred in zoos</td>
<td>21.2586</td>
<td>9.30E-05</td>
<td>***</td>
</tr>
<tr>
<td>Carrying out and supporting conservation projects outside of the zoo</td>
<td>9.6815</td>
<td>0.02148</td>
<td>*</td>
</tr>
<tr>
<td>Training keepers/staff/conservationists</td>
<td>13.9904</td>
<td>0.002918</td>
<td>**</td>
</tr>
<tr>
<td>Donations to conservation projects</td>
<td>0.9463</td>
<td>0.8143</td>
<td>NS</td>
</tr>
<tr>
<td>Scientific Research</td>
<td>3.3266</td>
<td>0.344</td>
<td>NS</td>
</tr>
<tr>
<td>Other</td>
<td>3.3179</td>
<td>0.3452</td>
<td>NS</td>
</tr>
</tbody>
</table>

4.2.3 Perceived visitor priorities

All zoos thought their own priorities and visitor’s priorities for zoos were different (Table 5). Zoo’s ranking of providing a fun day out between their own priorities (4th place) significantly differed to perceived visitor priorities (2nd place) as tested using a Wilcoxon matched pairs test (T=1944.5, p=<0.05). Other interesting differences are that zoos perceived visitors to prioritise reintroduction programmes (5th) higher than zoos do (7th).

Comparing perceived visitor priorities by zoos and visitors actual priorities a number of differences are found, as seen in Table 6. Zoos prioritising providing a fun day out from the visitor’s perspective is misinformed as visitors rank it at 7th place instead of 2nd. Visitors also prioritise the active in-situ conservation work of reintroducing animals and conservation projects higher than the zoos perceive them too.
Table 6: Visitor’s zoo priorities from the perspective of both visitors and zoos. The data from the zoo visitors is collated from ZSL Whipsnade Zoo and Marwell wildlife and consists of 349 visitors. The zoos perceived visitor priorities were collected from a questionnaire completed by 34 UK zoos. The ranks were calculated from a point system where the highest priority is given the value of 1 and the lowest priority given the highest value of 5. Reintroducing animals into the wild and breeding all animals in the zoo were both ranked at 5th place by zoos, therefore the next priority is placed 7th.

<table>
<thead>
<tr>
<th>Priorities</th>
<th>Zoo visitors</th>
<th>Zoo’s perceived visitor priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Caring for animals in the zoo</td>
<td>Caring for animals in the zoo</td>
</tr>
<tr>
<td>2</td>
<td>Educating the public about conservation issues</td>
<td>Providing a fun day out for the public</td>
</tr>
<tr>
<td>3</td>
<td>Reintroducing animals into the wild that were bred in zoos</td>
<td>Educating the public about conservation issues</td>
</tr>
<tr>
<td>4</td>
<td>Carrying out and supporting conservation projects outside of the zoo</td>
<td>Breeding endangered animals</td>
</tr>
<tr>
<td>5</td>
<td>Breeding endangered animals</td>
<td>Reintroducing animals into the wild that were bred in zoos</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Breeding all animals regardless of whether they are endangered</td>
</tr>
<tr>
<td>6</td>
<td>Breeding all animals regardless of whether they are endangered</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Providing a fun day out for the public</td>
<td>Carrying out and supporting conservation projects outside of the zoo</td>
</tr>
<tr>
<td>8</td>
<td>Training keepers/staff/conservationists</td>
<td>Donations to conservation projects</td>
</tr>
<tr>
<td>9</td>
<td>Donations to conservation projects</td>
<td>Training keepers/staff/conservationists</td>
</tr>
<tr>
<td>10</td>
<td>Scientific research</td>
<td>Scientific research</td>
</tr>
<tr>
<td>11</td>
<td>Other</td>
<td>Other</td>
</tr>
</tbody>
</table>

Six of the rankings between the visitors’ priorities at the three sites and the zoos perception of visitors’ priorities were significantly different (Table 7). The differences previously explained suggest the differences are between the visitor’s priorities and the zoos perception, not between the visitor sites themselves.
Table 7: Differences between visitor’s priorities for zoos and perceived visitor priorities by zoos. A Kruskal-Wallis test was used to compare rankings between the four sets of data, visitor data from ZSL Whipsnade Zoo, Marwell Wildlife and Tring Natural History Museum and the zoo data from 34 zoos in the UK. The Df is 3. The p values are as follows: *0.05, **0.01, ***0.001, NS represents Not Significant.

<table>
<thead>
<tr>
<th>Priorities</th>
<th>$\chi^2$ value</th>
<th>Significance value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caring for animals in the zoo</td>
<td>9.3215</td>
<td>0.02531</td>
<td>*</td>
</tr>
<tr>
<td>Educating the public about conservation issues</td>
<td>0.4222</td>
<td>0.9356</td>
<td>NS</td>
</tr>
<tr>
<td>Breeding all animals regardless of whether they are endangered</td>
<td>0.3663</td>
<td>0.9471</td>
<td>NS</td>
</tr>
<tr>
<td>Breeding endangered animals</td>
<td>4.4577</td>
<td>0.2161</td>
<td>NS</td>
</tr>
<tr>
<td>Providing a fun day out for the public</td>
<td>47.1979</td>
<td>3.16E-10</td>
<td>***</td>
</tr>
<tr>
<td>Reintroducing animals into the wild that were bred in zoos</td>
<td>13.5049</td>
<td>0.003663</td>
<td>**</td>
</tr>
<tr>
<td>Carrying out and supporting conservation projects outside of the zoo</td>
<td>13.3032</td>
<td>0.004025</td>
<td>**</td>
</tr>
<tr>
<td>Training keepers/staff.conservationists</td>
<td>8.7245</td>
<td>0.03319</td>
<td>*</td>
</tr>
<tr>
<td>Donations to conservation projects</td>
<td>4.0292</td>
<td>0.2583</td>
<td>NS</td>
</tr>
<tr>
<td>Scientific Research</td>
<td>8.5686</td>
<td>0.03561</td>
<td>*</td>
</tr>
<tr>
<td>Other</td>
<td>0.6376</td>
<td>0.8878</td>
<td>NS</td>
</tr>
</tbody>
</table>

4.2.4 Conservation focus of zoos and perception of visitor knowledge

The zoos were asked two additional questions. Zoos were asked what area of conservation they focus on to which a variety of responses were given which were later combined into 7 categories (Fig. 12). Also, zoos usually named more than one focus area. Around 41% of zoos mentioned habitat conservation as a main priority. The second focus area was captive breeding programmes and a specific animal group/area (both at 28%). Only 17% of zoos mentioned focusing on endangered species. This is contradictory to what zoo visitors expected where 38% wanted zoos to focus on endangered species and less on habitat (16%).
Secondly, zoos were asked whether they expected visitors to know the conservation projects at their zoo. 15% thought that visitors would not know their zoo projects. Of those who answered yes, 30% thought they would due to the education programmes at the zoo and 24% explained that there is information in both education programmes and signage.

4.3 Visitor understanding of zoo conservation

A number of questions reveal the public's overall understanding of zoo conservation. The knowledge based questions provide a useful insight into how much visitors know and understand about zoo conservation. Whether the visitors expect zoos to contribute to conservation, and why, can reveal their understanding of the movement of zoo conservation. This is also shown in the visitor priorities section. The basic results of these questions have been discussed previously.

Differences in the understanding by zoo members and non-members existed (Table 8). A total of 51% of zoo members felt informed compared to 38% of non-members. How informed they feel reflected in their answer of how satisfied they feel with UK zoo conservation as “don’t know enough about zoo conservation” being the most popular answer overall. Almost half (48%) of members expressed that they did not know enough
compared to 64% of non-members. There were also significant differences in the knowledge based questions. Zoo members were able to name more ways that zoos contribute to conservation with 40% naming 2-4 ways compared to 27% by non-members. Zoo members also named more non-charismatic species when asked which animal zoos have helped save from extinction (members=12%, non-members=3%). A substantially larger percentage of non-zoo members could not name any zoo projects at 64% compared to 35% of members. There are also slight differences in whether people expect zoos to contribute to conservation and why, with 6% of non-members not expecting zoos to contribute compared to 1% of members. The previous questions were not analysed with the number of visits in the last year as this was significantly different between members and non-members, with members visiting more often at 48% visiting 10+ a year compared to 4% of non-members.

Table 8: Differences between zoo members and non-zoo members understanding of zoo conservation. The data was collated from ZSL Whipsnade Zoo and Marwell Wildlife, with 137 members and 212 non-members. A Mann-Whitney U test was used to analyse the differences. The p values are as follows: *0.05, **0.01, ***0.001.

<table>
<thead>
<tr>
<th>Question</th>
<th>w stat</th>
<th>Significance value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>How informed visitors feel</td>
<td>18348</td>
<td>9.40E-06</td>
<td>***</td>
</tr>
<tr>
<td>Satisfaction with UK zoo conservation</td>
<td>17832.5</td>
<td>4.77E-05</td>
<td>***</td>
</tr>
<tr>
<td>Number of ways that zoos contribute to conservation named</td>
<td>12574.5</td>
<td>0.02694</td>
<td>*</td>
</tr>
<tr>
<td>Animal that zoos have helped save from extinction</td>
<td>12648.5</td>
<td>0.03671</td>
<td>*</td>
</tr>
<tr>
<td>Naming of zoo projects</td>
<td>10420</td>
<td>1.31E-06</td>
<td>***</td>
</tr>
<tr>
<td>Whether people expect zoos to contribute to conservation and why</td>
<td>12720</td>
<td>0.04662</td>
<td>*</td>
</tr>
<tr>
<td>Number of zoo visits in the last year</td>
<td>3087</td>
<td>2.20E-16</td>
<td>***</td>
</tr>
</tbody>
</table>

The Tring dataset revealed differences between visitors that had not visited a zoo in the past year (non-zoo visitors, n=55) and those that had (n=101). More non-zoo visitors reported to feel “uninformed” about zoo conservation (40%) than those who had visited a zoo (19%). Around 42% of non-zoo visitors could not name any methods of how zoos contributed to conservation compared with 34% of visitors who had visited a zoo. However, of those non-zoo visitors a higher percentage could name more methods, with 9% of non-zoo visitors naming 4 methods compared to 2% of zoo visitors. More non-zoo visitors were not able to name any animals which zoos had helped to save (33%) compared to those who had visited a zoo (20%). Of those that could name an animal, more visitors that had visited a zoo named a non-charismatic species (8%) than non-zoo visitors (2%). Less non-zoo visitors gave the answer that “conservation is part of the zoo” in the conservation expectation question (22% compared to 28%). The only significant difference between the non-zoo visitors and zoo
visitors at Tring was how informed they felt about zoo conservation (Mann-Whitney U, \( w=3504.5, p=<0.01 \)).

The understanding of zoo conservation was expected to differ between the ages of the visitors, with the older visitors having less understanding as they had been brought up with the traditional image of zoos. It appears, though, that the first age category of 18-29 year olds have less understanding of zoo conservation than the other generations. The younger generation feel less informed about zoo conservation than the other ages with the majority feeling neutral (52% compared to the average of 31% across the age groups). More 18-29 year olds could not name any ways which zoos contribute to conservation (59%) compared to the average of 35% across the age groups. The youngest age category also answered “tiger” to the question about which animal zoos have helped save more than the other age groups (30% compared to 22%). However, more 30-39 year olds could not name a species (30% compared to 21%). Younger visitors also have the lowest membership (23% members compared to the highest membership 53% 30-39 year olds) and number of visits in a year (35% had visited 0 times in the last year compared to lowest of 17% of 30-39 year olds).

Another difference in this trend is that the 60+ age group responded less “that conservation was part of the zoo” than the other age groups at 16% compared to the highest response of 27% of 30-39 year olds. A number of these differences are significant, as seen in Table 9.

Table 9: Difference of zoo conservation understanding with age. The data was collated from ZSL Whipsnade Zoo and Marwell Wildlife. The sample sizes are as follows: 18-29=56, 30-39=115, 40-49=77, 50-59=38, 60+=63. A Kruskal-wallis test was used to analyse the differences. The p values are as follows: *0.05, **0.01, ***0.001. NS means Not Significant. DF=4

<table>
<thead>
<tr>
<th>Question</th>
<th>( \chi^2 )</th>
<th>Stat</th>
<th>Significance value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>How informed visitors feel</td>
<td>18.9356</td>
<td>0.000809</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Satisfaction with UK zoo conservation</td>
<td>14.5648</td>
<td>0.005695</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Number of ways that zoos contribute to conservation named</td>
<td>21.8567</td>
<td>0.000215</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Animal that zoos have helped save from extinction</td>
<td>5.0023</td>
<td>0.2871</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Naming of zoo projects</td>
<td>12.9188</td>
<td>0.01168</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Whether people expect zoos to contribute to conservation and why</td>
<td>4.4785</td>
<td>0.3451</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Zoo membership</td>
<td>23.035</td>
<td>0.00012</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Number of visits in a year</td>
<td>25.6573</td>
<td>3.76E-05</td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>
5. Discussion

To improve communication between zoos and the visiting public, especially in relation to how zoos contribute to conservation, investigations of visitor perception are necessary. This study is probably the first to assess what the visiting public understands regarding what zoos are doing for conservation.

5.1 Conservation interest

Zoo’s education programmes aim to not only teach visitors about conservation but also to inspire an interest in this area (Gwyne, 2007; Rabb and Saunders, 2005). Despite this role only around a third of zoo visitors were likely to have a real interest in conservation as revealed through their conservation organisation membership and active contributions. This low membership is somewhat surprising given the reported rise in organisation membership by some authors (Street, 2004 cited in Hutchins, 2007). However, membership results may be affected by the person’s current financial situation and may not be a good proxy of interest in conservation as has been suggested by Balmford et al., (2007). Furthermore, this low level of committed conservation interest compared to the high amount that claimed to have an interest reveals that numerous questions, as used in this study, are needed to truly discover the public’s opinions. Therefore, zoos have a large audience to inspire and enthuse about wildlife conservation to achieve their aims.

In terms of interviewees’ interest in zoo conservation, only around a third of visitors expressed any keen interest. This is reflected in zoo membership and number of visits in the past year. This study also revealed that the majority of visitors are motivated to come to the zoo for a ‘fun day out’ and not to ‘support the zoo’s conservation work’; zoos provide entertainment (West and Dickie, 2007; Carr and Cohen, 2011) and thus membership and number of visits do not necessarily indicate an interest in zoos as conservation institutions. This is further supported by the fact that though Tring visitors had a lower number of visits and membership, only a very small proportion of them gave negative reasons for not visiting a zoo. Testing the visitors’ knowledge on conservation work by zoos can also indicate a keen interest in zoo conservation, as those that are more interested are more likely to be more informed. These knowledge based questions provided further support that only a small proportion, a third, of visitors have a higher-level interest. These questions, along with those
visitors that are members to both conservation organisations and a zoo, revealed that under a tenth of visitors are very interested in zoo conservation. Therefore, only a third of visitors will actually take a keen interest in learning about zoos conservation efforts during their visit which means that zoos need to do more to develop unique and engaging ways to attract and motivate the public to take an active interest.

5.2 Visitor expectations of zoo conservation

Despite the relatively low interest in zoo conservation this study also revealed that visitors have high expectations for zoo’s involvement in conservation. This is the first time that such expectations have been explored. These results have important implications for future conservation efforts of zoos.

The need for zoos to contribute to conservation is not only a high priority for the conservation community but is also perceived by the public as important. The expectation that zoos should contribute to conservation was almost unanimous in this study. Although visitors perceive conservation as the primary role of a zoo (Puan and Zakaria, 2007) this is their perception not expectation. A variety of reasons were given for this expectation in this study which also gains an insight into the public’s overall perception. The reason that “zoos have animals in captivity and should help save wild animals” was most frequently cited. This supports the suggestion that conservation may just be a reaction to criticisms of captivity and zoos aren’t truly dedicated to conservation (Gusset and Dick, 2010). The support for this reason further illustrates the growing issue of animal welfare within today’s society (West and Dickie, 2007; Knowles, 2003; Hutchins, 2007), especially with the young generation whom mainly cited this reason.

The issues of animal welfare are further emphasised in visitor’s priorities as they considered the first priority for zoos should be ‘caring for animals’. Visitors may therefore be more concerned with welfare than conservation but may not be able to distinguish between the two (Mellen, 2003 in Hutchins 2007). However, the remaining three priorities support the high expectations that visitors have for zoo conservation. Primarily, visitors valued the education role of zoos as they prioritised ‘educating the public about conservation issues’ second. Along with the high ranking of coming to the zoo ‘to learn about animals’ this suggests that nature documentaries may have not made zoos redundant (Broad and Smith,
This also contradicts Hyson (2004) who suggested that visitors do not come to the zoo to learn about conservation. In this study, visitors also expressed agreement with the current zoo philosophy as they expect zoos to contribute significantly to in-situ conservation instead of captive breeding. Furthermore, they expect zoos to be thoroughly involved in conservation projects instead of just donating to organisations (12th).

Monetary contributions to conservation is a contentious issue within the zoo community as it can truly represent their dedication to in-situ conservation and there are great variations in contributions between zoos but also opinions on how much should be donated (Kelly, 1997; Zimmerman and Wilkins, 2007; Fa, Funk and O’Connell, 2011). Although various schemes have been initiated to record zoos monetary contributions they have so far proved difficult to compile (Christie, 2007). In this study most visitors did not know what percentage of zoos’ annual income they expected zoos to contribute to in-situ projects. Visitors often explained that they did not know the finances of zoos suggesting they need to be better informed. However, the majority of visitors who did feel knowledgeable expected zoos to spend a considerable amount with most expecting 20-29%, closely followed by 10-19%. Over half of the visitor’s expectations are vastly higher than the majority of both UK and global zoo contributions who on average contribute 3.6% (Zimmerman and Wilkinson, 2007; Fa, Funk and O’Connell, 2011). There are currently only two zoos in the UK that lie in the realms of visitor expectations by investing over 20% of their income. Not only are many zoos failing to reach the expectations of the public but are surely failing to reach their conservation requirements with 27% of zoos not contributing at all (Fa, Funk and O’Connell, 2011). Although zoos can raise significant funds for conservation, as shown through funding for Sumatran tigers and Amur leopards (Christie, 2007), this is through campaigns and activities not directly from their income. Visitors therefore have much higher expectations of zoos than zoos are currently fulfilling.

Conservation undertaken by zoos varies. The answers given by visitors may have reflected this since they were often broad, though divisible into three categories. Most visitors expected zoos to focus on endangered species conservation. Although zoos generally appear to focus on endangered species especially in terms of captive breeding there has been debate to the sincerity of this with only a quarter of threatened mammals being represented in zoos (Conde et al., 2011). Next, most visitors did not mind what area of
conservation zoos focused on. It is important that this is not mistaken for visitors not wanting zoos to contribute to conservation at all. Under a fifth of visitors wanted a more landscape approach with the focus on habitat and many recognised that it did have an umbrella effect by explaining “save the habitat and the species will follow”.

5.3 Visitor satisfaction

Visitor satisfaction is an important aspect to monitor within exhibit-related industries (e.g. Tomas, Crompton and Scott, 2003). Satisfaction with zoo’s conservation efforts can have major implications on the financial situation and future direction of zoos. This is particularly relevant in our current society as the need to be ‘green’ and awareness of animal welfare is at the forefront of many people’s minds. Zoos not only have to respond to their declared intentions of being more active in conservation but also to the demands of society.

Uniform satisfaction would indicate that zoos are achieving their own and visitor’s aspirations of becoming centres of conservation. However, there were mixed opinions on the approval of zoos current efforts. Over a third of zoo visitors interviewed in this study appear satisfied by zoos conservation efforts. However, less than one tenth of this third were very satisfied. These visitors may therefore feel that zoos are fulfilling their role as conservation centres but are not excelling. In contrast, a fifth of visitors suggest that they may be unsatisfied as they perceived zoos to have vastly different priorities to their own. If visitors perceive their own priorities and zoos to align they are more likely to feel a greater connection to zoos and feel that zoos are satisfying the public’s interests. However, a third of visitors did not know enough about zoo conservation to comment on their satisfaction, again reiterating the need for the public to be better informed. With the majority of visitors unable to comment on their satisfaction or are dissatisfied this suggests that zoos are not meeting their visitors needs and have ample room for improvement especially if they strive for full public support.

5.4 Zoo and visitor congruence

This study has first quantified visitors’ knowledge of the conservation work undertaken by zoos. What visitors’ believe zoos should do for conservation and what zoos themselves are achieving is important to compare and contrast particularly as there could be some clear discrepancies in what visitors understand.
Zoos proclaim that they are or should be centres for conservation with greater focus on *in-situ* efforts instead of captive breeding (Hutchins, 2003; Conway, 2007). This is partially due to various criticisms which breeding and reintroduction efforts have received (e.g. Snyder *et al.*, 1996; Bowkett, 2009) but also the acknowledgement that zoos can benefit field projects (Hutchins and Smith, 2003). However, the results of this study indicate that this change in conservation focus is not reflected in the zoos priorities suggesting that they are not following recommendations of current zoo philosophy. Firstly, zoos only cited two conservation related activities in their top four priorities; education and captive breeding of endangered species. Secondly, not only are *in-situ* efforts not cited in the top four priorities, but captive breeding efforts appear to have precedence over *in-situ* efforts. Furthermore, when looking at zoo’s priorities there does appear to be disparity between zoo staff. Although this has not been directly analysed in this study due to a small sample size, respondents often commented that “these are my opinions and may not be representative of other staff”. This is noteworthy as all zoo staff should be conservation orientated to provide a unified face for zoos (Miller *et al.*, 2004; West and Dickie, 2007).

Priorities of zoos (or their personnel) and visitors are distinctly different as shown in this study. However, both parties value animal welfare issues and education over and above other roles of the zoo, supported by Reade and Waran (1996), Broad and Weiler (1998) and Hutchins (2003). The disparity between zoos and their visitors lie in the prioritisation of conservation. Visitors responded in this study that *in-situ* conservation action must be an important outcome for zoos involved in conservation, with reintroductions and leading as well as supporting conservation projects featuring in the visitor’s top four priorities. This was not the case for zoos. Interestingly, zoos prioritise ‘having a fun day out’ over *in-situ* efforts and proportionately higher than visitor’s prioritise it. Zoos are clearly responding to their reliance on visitors for funds and in response to the primary motivational factor for visiting a zoo, a fun day out (Reade and Waran, 1996; Yocco *et al.*, 2010). Although visitors recognise this priority and are motivated to visit a zoo for fun they expect zoos to focus more on conservation than providing entertainment. This is concerning since zoos would seem to be under pressure to become more effective conservation centres and therefore support more *in-situ* action (WAZA, 2006). Not only are zoos and their visitor’s priorities incongruent but it appears that zoos also misunderstand visitor’s priorities. Comparing zoos
perceptions of visitor’s priorities and visitor’s actual priorities reveals that zoos do not realise the value that visitors place on in-situ conservation, instead zoos think visitors prioritise providing a fun day out even higher then zoos do themselves. This significant misunderstanding by zoos has great implications for the effectiveness of their education programmes as zoos must first understand their visitors to successfully teach them. Furthermore, whether visitors would be less interested in zoos if they focused less on entertainment and more in conservation is still to be tested.

The area of conservation focus also differed between zoos and their visitors. The majority of visitors in this study suggested zoos should focus on endangered species, however less than a fifth of zoos mentioned this. Most zoos responded that focus on habitat conservation was a priority whereas less than a quarter of visitors mentioned this. Zoos may suggest habitat as more important because landscape approaches incorporate many endangered species. This seems contrary to previous criticisms which argue that zoos rarely participate in habitat restoration (Conway, 2003). However, the responses received from the zoos themselves may reflect individual staff perceptions rather than policy. Certainly, habitat conservation is important as proposed by Hutchins and Smith (2003) or Kelly (1997) who argue for ‘zoo reserves’ as Conway (2007) recommends. Nevertheless, just under half of the visitors have no preference for which area zoos focused on.

Although the zoos did not expect visitors to prioritise conservation related options, the majority did expect visitors to know about their conservation projects. Zoos would no doubt be surprised and disappointed to find that the majority of visitors interviewed could not name any zoo projects. Zoos would expect visitors to know the projects from their education programmes and signage. From this study, it can be argued that the current effort is evidently ineffective and other ways must be pursued to greater improve visitor knowledge and understanding.

5.5 Visitor understanding of zoo conservation

It is essential that visitors fully understand the conservation role of zoos so they appreciate efforts made by these institutions, provide further support as well as have a greater knowledge of conservation issues. Analysing visitors’ understanding of these issues also allows zoos to develop their education programmes appropriately. Overall, visitors appear
to understand the role which zoos have but do not appear to have a thorough knowledge and understanding of how.

Visitors do perceive zoos to be centres of conservation supporting other visitor studies (e.g. Puan and Zakari, 2007; Reade and Waran, 1996). This is clearly portrayed when visitors answered “conservation is part of the zoo” for why they expected zoos to contribute to conservation. It is clearly an assumption that zoos will, without question, automatically contribute to conservation. Visitors also listed three conservation related options in their perceived zoo priorities. However, visitor’s understanding is misinformed as they prioritise reintroduction projects despite the lack of success. This is undoubtedly because zoos and the media do not portray negative messages and conservation failures to the public (Conway, 2003). In contrast, Tring visitors perceived zoos to be more of a centre of entertainment rather than conservation, this may because of the rate of visitors who have not visited a zoo in the past year. Comparing visitor’s perception of zoos priorities and zoos priorities there are significant differences especially in terms of in-situ conservation. This suggests that zoos are effectively portraying the image of conservation to visitors; however, their own priorities reveal that they are not supporting this image within the organisation.

This supports Conway (2003) who suggested that there are many zoo priorities that are unrelated to the priorities of wildlife.

The lack of in-depth understanding is clear from the responses of the knowledge based questions in this study. Although the majority of visitors felt informed about zoo conservation, answers to the knowledge based questions and especially the high percentage of responses that they ‘didn’t know enough about conservation’ actually points to a clear lack of thorough understanding by visitors. Despite there being some differences in how informed visitors were between the three sites, there was no significant difference in their actual knowledge.

Visitors current understanding is a reflection of the messages received in the media and at the zoo which would indicate that at present this is not adequate nor highlighting the vast and varied efforts of zoos. This is exemplified with the common response of ‘captive breeding’ as a way that zoos can contribute to conservation. This may indicate that visitors are still more responsive to traditional zoo conservation efforts instead of the shift towards
in-situ conservation. However, captive breeding is still emphasised by zoos especially with the advertisement of zoo babies which obviously has an entertainment and emotional value. Highlighting captive breeding may mislead conservationists about practical solutions (Mazur and Clark, 2001) but also the public. Both zoos also had a low response rate in visitor knowledge of zoo projects. This is despite clear messages near the entrance/exit about conservation efforts; Whipsnade even had a video with clear messages mentioning numerous conservation projects. This is a reflection of lack of retention of conservation messages but also that captive breeding is still the dominant message received at the zoo.

The way to reach visitors about current in-situ efforts may be by reinforcing conservation messages in a variety of ways such as through new advertising campaigns or exhibits as both the new tiger SOS project at Whipsnade and Savannah Tracks, the cheetah project at Marwell, were often cited. These species are unmistakably charismatic mega fauna, which are also mainly mentioned when asked what animal have zoos helped save from extinction. It is clearly more difficult to name a non-charismatic species and thus naming one shows the potential for greater understanding. Charismatic species are obviously a dominant image in the public eye and often used as publicity for zoos and conservation organisations. Although zoos do help non-charismatic species such as coral (ZSL, n.d. c), Gusset and Dick (2005) found that the majority of in-situ projects focused on charismatic species such as mammals, again reinforcing reasons for the visitors lack of understanding in this research.

There was also a difference in the understanding of conservation between the age groups of zoo visitors. Interestingly, the differences appear to lie between the younger visitors (18-29 years old) and the remaining groups. The younger visitors not only felt less informed but this was reflected in their inability to answer the knowledge based questions. This is surprising as it was expected that the older visitors would have less understanding as they have had greater experience of traditional zoos. The lower understanding of younger visitors may arise from their lower membership rate and number of visits in the last year, thereby suggesting visits to zoos does affect visitor’s understanding. It is then vital for zoos to encourage an interest in conservation and advocate environmental stewardship for the young generation early on in their lives.

The role of zoos in visitors understanding was further demonstrated by the significantly greater appreciation shown by zoo members as compared to non-members. A significant
difference between number of visits between non-members and members also suggests that with more visits to the zoo the greater the understanding. This supports Reading and Miller (2007) who found that the number of visits affected visitor attitudes towards zoos. Furthermore, members usually receive supplementary and engaging material from zoos such as newsletters and emails enhancing their understanding which could be made more easily available to the wider public.

Categorising Tring data into zoo visitors and non-visitors not only highlights differences in understanding but also the effect that zoos have on visitor perceptions. Despite a significant difference in how informed visitors and non-visitors felt at Tring there were only small variations in the knowledge based questions. This result is surprising and suggests that non-visitors gain information from other sources such as media (Rabb and Saunders, 2005). A difference in the understanding and perception of zoo conservation is clear in the past decade by comparing why non-visitors had not visited a zoo to a previous study (Hopper 1999). Only 5% of Tring visitors had issues with animals in captivity compared to 31.5% in Hopper (1999), therefore zoos are better understood and are less of an animal welfare issue. This is unexpected as there has been an increase in animal welfare concern recently (West and Dickie, 2007) but zoos may now be perceived more as centres of conservation thereby counteracting welfare issues. As non-visitors have an understanding of zoo conservation but members have the greatest understanding this supports the idea that zoos can act in unison with media and reinforce visitors knowledge particularly concerning the variety of ways zoos can contribute to conservation (Broad and Smith, 2004; Falk et al., 2007).

5.6 Recommendations

To succeed as centres of conservation zoos must react to visitor’s expectations by intensifying their actions and make greater efforts to improve visitors understanding. Although visitors currently do perceive zoos as centres of conservation, mainly in-situ conservation, it is evident that zoos have different priorities.

5.6.1 Enhancing visitors understanding

Now that it is clear that zoos visitors do not have a full understanding of zoos role in conservation zoos must adapt their educational material (Patrick, et al., 2007). As visitors
expect zoos to be conservation centres zoo’s efforts should be clear and well portrayed. Their current efforts of educating the public in education programmes and signage are clearly not sufficient. Zoos need to make a greater effort to understand their visitors so they can provide a successful education programme. They must re-establish education programmes which are more conservation based to entice and inspire visitors to become actively interested in conservation (Hatchwell et al., 2007). To achieve this zoos must create novel ways which combine both entertainment and education (Carr and Cohen, 2011; Tomas, Crompton and Scott, 2003; Packer, 2004) such as ZSL’s innovative ‘Zoo nights’, without the focus becoming purely entertainment. This is especially true to attract families which are the common visiting groups and prove difficult to teach (Yocco et al., 2010) as it is the children of these families which will have a significant influence on conservation in the future. Various techniques need to be created such as a ‘conservation news of the day board’ which can update visitors in a friendly and informative way of progress with current conservation projects. To educate the public about different methods, elicit interest and show visitors where their money directly goes to conservation zoos could use the highly acclaimed method that is used in the Congo Gorilla Forest in Bronx zoo where visitors decide where their admission fee is spent (Conway, 2011). A way to inform non-visitors and attract the younger generation would be to take advantage of the media and local amenities such as libraries. Zoo television programmes and YouTube videos currently used by many zoos such as ZSL can focus more on conservation efforts as well as animal husbandry. Conservation blogs recorded in-country can provide exhilarating and informative viewing which could also be transformed into podcasts.

5.6.2 Practice what they preach

Both visitors and the zoo community have high expectations for zoo’s contributions to conservation. Zoos need to intensify their efforts to meet these expectations but also to fulfil the role that they are portraying. Zoos have previously cited that they can strengthen their in-situ efforts (Zimmermann and Wilkinson, 2007) so therefore they need to finally shift their focus away from captive breeding and entertainment to truly beneficial in-situ conservation. This need for intensification has not only become evident in this study but is commonly highlighted in the literature (Conway, 2003; Fabregas et al., 2011; Gusset and Dick, 2010), yet few zoos appear to be adopting this approach. Zoos are heterogeneous with
different specialities and performance (West and Dickie, 2007) however all zoos need to comply with this intensification of effort. This can also be applied to the monetary contributions, where to substantiate their role within the conservation community zoos need to contribute a greater percentage of their income to direct conservation activities. Their contributions could be increased by lowering their expenditure on housing and captive breeding of species which are not threatened (Conway, 2011). Therefore, minimum requirements and further guidelines should be created, not only for monetary contributions (Kelly, 1997) but for active conservation actions.

5.7 Limitations

The majority of the limitations for this study are during the data collection and are typical of questionnaire studies. These findings are representative of the off-peak season at each site. Visitors were often not alone when interviewed which sometimes caused conferring with other members of the group. This was despite asking one person to answer the questions and it was thought inappropriate to ask the visitors to stop.

Prior to data collection it was a concern that only those interested in conservation would participate. However, the high participation rate, sample size and answers confirm that people with varying interests in conservation took part. The participation rate and sample size is larger than many other studies (e.g. Puan and Zakaria, 2007; Tomas, Crompton and Scott, 2003) and some do not report their participation rate (e.g. Balmford et al., 2007; Reade and Waran, 1996). Another concern which is often experienced with questionnaire studies is demand characteristics. This could have occurred but various responses suggest that they were not heavily influenced. Participants could have also rushed this questionnaire to finish it, however as they were aware of the time period it took this is unlikely.

There were also statistical limitations with this dataset due to the non-parametric nature of questionnaire data. The comparisons between the sites were limited due to the unavailability of a post-hoc test. Furthermore, the differences in sample size between the visitor and zoo priorities made direct comparison unfeasible.
5.8 Future research

There are a number of directions which this research could continue in. It would be interesting to analyse whether there is a difference of priorities within the zoo community and especially personnel in the zoos themselves. This could reveal whether there is additional disparity within zoos which could influence how the public perceives them. To provide the public with a clear image of the role of zoos in conservation there needs to be continuity not only within single zoos but the zoo community. Similar research into the public perception of conservation work by zoos in other countries could provide an interesting comparison to the UK. This could reveal whether the UK is behind at portraying their role or whether it is a natural progression.
6. References and Appendices

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Appendices

Appendix 1: Zoo Visitor Questionnaire

Preamble after approaching

Hi, my name is Abbie Shaw and I am a Master’s student at Imperial College London studying Conservation Science. I am carrying out research into the public’s perceptions of conservation work carried out by zoos. To complete this research I am surveying zoo visitors and I would appreciate your opinions. Please would you mind giving me 5-8 minutes of your time to complete this short questionnaire? If you have any queries feel free to ask.

Definition of conservation: The preservation and careful management of the environment and of natural resources, including the safeguarding of species.

Part 1 - Demographics:

Are you a UK resident? □ Yes □ No

Sex: □ M □ F

Age: □ 18-29 □ 30-39 □ 40-49 □ 50-59 □ 60+

Group: □ Group □ Family □ Couple □ Lone

Education (highest level)

□ Secondary School □ College/6th Form □ University □ Postgrad □ Other ______________

Occupation

□ Student □ Employed □ Self-Employed □ Retired □ Part-time

□ Unemployed □ Environmental sector □ House Wife □ Other ______________

Part 2 - Interest in conservation and zoo conservation

Are you a member of any conservation organisations/charities/UK zoo? (e.g. World Wildlife Fund)

□ No □ Yes (Please state) ________________________________

How interested are you in nature conservation?

□ Very Interested □ Interested □ Neutral □ Disinterested □ Very disinterested □ Don’t know

Do you contribute to conservation in any way, for example recycling or reduced car use?

□ No □ Don’t know □ Yes (Please state) ________________________________

How many times have you visited a UK zoo in the last year? (Excluding this visit)

□ 0 □ 1-3 □ 4-6 □ 7-9 □ 10+
Are you aware of how zoos contribute to conservation? If yes, please list up to four different ways in which zoos help to conserve animals.

☐ No      ☐ Yes      ☐ Don’t know

Which animal/s do you think zoos have contributed in saving from extinction (the species dying out)?

☐ Don’t know

Are you aware of any conservation projects that this zoo carries out?

☐ No      ☐ Don’t know      ☐ Yes (Please state)

What influenced you in coming to this specific zoo today? Please rank the top 4 following options (1 being highest reason and 4 the lowest):

_____ Price
_____ To learn about animals
_____ To support the conservation work carried out by the zoos
_____ The zoo has a good reputation
_____ For a fun day out
_____ Location of the zoo
_____ The zoo’s animal collection
_____ The zoo’s welfare standards e.g. enclosure size

How informed do you feel about conservation work by zoos?

☐ Very informed      ☐ Informed      ☐ Neutral      ☐ Uninformed
☐ Very uninformed      ☐ Don’t know

Part 3 – Expectations:

Do you expect zoos to contribute to conservation and why?

☐ No      ☐ Yes

☐ Don’t know

In your personal opinion what do you think the top 4 priorities of a zoo should be, please rate the following (1 being the highest priority):

_____ Caring for animals in the zoo
_____ Educating the public about conservation issues such as threatened species
_____ Breeding animals in the zoo regardless of whether they are endangered in the wild
_____ Breeding endangered animals in the zoo
_____ Providing a fun day out for the public
_____ Reintroducing endangered animals into the wild that were bred in zoos
_____ Carrying out and supporting conservation projects outside of the zoo to conserve wild animals
_____ Providing expert training for keepers/staff/conservationists
_____ Donations to conservation organisations/project
_____ Scientific Research
_____ Other
What percentage of the zoos annual income do you expect them to contribute to conservation projects outside of the zoo?

- 1-9%
- 10-19%
- 20-29%
- 30-39%
- 40-49%
- 50% +
- Don’t know
- 0%

What area of conservation would you like to see zoos focus on? E.g. Habitat, species, climate change

- Don’t know
- Don’t mind

Part 4 – Satisfaction:

How satisfied are you with conservation work carried out by UK zoos?

- Very satisfied
- Satisfied
- Neutral
- Unsatisfied
- Very unsatisfied
- Don’t know enough about conservation work
- Don’t know my opinion

Do you think there is a difference between the priorities which YOU think zoos should have, and the priorities which zoos actually hold themselves? (Comparing to the priorities previously given)

- No
- Yes
- Don’t know

If Yes: What do you think the zoos priorities are? Please rank the following top 4 priorities (1 being the highest priority):

- Caring for animals in the zoo
- Educating the public about conservation issues such as threatened species
- Breeding animals in the zoo regardless of whether they are endangered in the wild
- Breeding endangered animals in the zoo
- Providing a fun day out for the public
- Reintroducing endangered animals into the wild that were bred in zoos
- Carrying out and supporting conservation projects outside of the zoo to conserve wild animals
- Providing expert training for keepers/staff/conservationists
- Donations to conservation projects/organisations
- Scientific research
- Other

Thank you very much for your time, do you have any questions?
Appendix 2: Non-Zoo visitor questionnaire

Preamble after approaching

Hi, my name is Abbie Shaw and I am a Master’s student at Imperial College London studying Conservation Science. I am carrying out research into the public’s perceptions of conservation work carried out by zoos. To complete this research I am surveying zoo visitors and I would appreciate your opinions. Please would you mind giving me 5-8 minutes of your time to complete this short questionnaire? If you have any queries feel free to ask.

Definition of conservation: The preservation and careful management of the environment and of natural resources, including the safeguarding of species.

Part 1 - Demographics:

Are you a UK resident?  [ ] Yes  [ ] No

Sex:  [ ] M  [ ] F

Age:  [ ] 18-29  [ ] 30-39  [ ] 40-49  [ ] 50-59  [ ] 60+

Group:  [ ] Group  [ ] Family  [ ] Couple  [ ] Lone

Education (highest level)

[ ] Secondary School  [ ] College/6th Form  [ ] University  [ ] Postgrad  [ ] Other

Occupation

[ ] Student  [ ] Employed  [ ] Self-Employed  [ ] Retired  [ ] Part-time

[ ] Unemployed  [ ] Environmental sector  [ ] Home maker  [ ] Other

Part 2 - Interest in conservation and zoo conservation

Are you a member of any conservation organisations/charities/UK zoo? (e.g. World Wildlife Fund)

[ ] No  [ ] Yes (Please state)

How interested are you in nature conservation?

[ ] Very Interested  [ ] Interested  [ ] Neutral  [ ] Disinterested  [ ] Very disinterested  [ ] Don’t know

Do you contribute to conservation in any way, for example recycling or reduced car use?

[ ] No  [ ] Don’t know  [ ] Yes (Please state)

How many times have you visited a UK zoo in the last year? (Excluding this visit)

[ ] 0  [ ] 1-3  [ ] 4-6  [ ] 7-9  [ ] 10+

Did you consider visiting a zoo today?

[ ] No  [ ] Yes  [ ] Don’t know
Why did you decide to not visit a zoo today? Please choose one reason.

- [ ] Not interested in animals
- [ ] Disapprove of any animals in captivity
- [ ] Didn’t have enough time
- [ ] Disapprove of animals in captivity that are not threatened
- [ ] Animals poorly presented
- [ ] To few active/social species
- [ ] Recently enough been to a zoo
- [ ] Zoos aimed at children
- [ ] Zoos do not contribute to conservation
- [ ] Other ____________________________
- [ ] Price

Are you aware of how zoos contribute to conservation? If yes, please list up to four different ways in which zoos help to conserve animals.

- [ ] No
- [ ] Yes
- [ ] Don’t know ____________________________

Which animal/s do you think zoos have contributed in saving from extinction (the species dying out)?

- [ ] Don’t know ____________________________

How informed do you feel about conservation work by zoos?

- [ ] Very informed
- [ ] Informed
- [ ] Neutral
- [ ] Uninformed
- [ ] Very uninformed
- [ ] Don’t know

Part 3 – Expectations:

Do you expect zoos to contribute to conservation and why?  

- [ ] No
- [ ] Yes
- [ ] Don’t know ____________________________

In your personal opinion what do you think the top 4 priorities of a zoo should be, please rate the following (1 being the highest priority) and please indicate if you think any of these should be irrelevant in a zoo:

- [ ] Caring for animals in the zoo
- [ ] Educating the public about conservation issues such as threatened species
- [ ] Breeding animals in the zoo regardless of whether they are endangered in the wild
- [ ] Breeding endangered animals in the zoo
- [ ] Providing a fun day out for the public
- [ ] Reintroducing endangered animals into the wild that were bred in zoos
- [ ] Carrying out and supporting conservation projects outside of the zoo to conserve wild animals
- [ ] Providing expert training for keepers/staff/conservationists
- [ ] Donations to conservation organisations/projects
- [ ] Scientific Research
- [ ] Other ____________________________
What percentage of the zoos annual income do you expect them to contribute to conservation projects outside of the zoo?

- [ ] 1-9%
- [ ] 10-19%
- [ ] 20-29%
- [ ] 30-39%
- [ ] 40-49%
- [ ] 50% +
- [ ] Don’t know
- [ ] 0%

What area of conservation would you like to see zoos focus on? E.g. Habitat, species, climate change

- [ ] Don’t know
- [ ] Don’t mind

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Part 4 – Satisfaction:

How satisfied are you with conservation work carried out by UK zoos?

- [ ] Very satisfied
- [ ] Satisfied
- [ ] Neutral
- [ ] Unsatisfied
- [ ] Very unsatisfied
- [ ] Don’t know enough about conservation work
- [ ] Don’t know my opinion

Do you think there is a difference between the priorities which YOU think zoos should have, and the priorities which zoos actually hold themselves? (Comparing to the priorities previously given)

- [ ] No
- [ ] Yes
- [ ] Don’t know

If Yes: What do you think the zoos priorities are? Please rank the following top 4 priorities (1 being the highest priority) and please indicate if you think any of these should be irrelevant in a zoo:

1. Caring for animals in the zoo
2. Educating the public about conservation issues such as threatened species
3. Breeding animals in the zoo regardless of whether they are endangered in the wild
4. Breeding endangered animals in the zoo
5. Providing a fun day out for the public
6. Reintroducing endangered animals into the wild that were bred in zoos
7. Carrying out and supporting conservation projects outside of the zoo to conserve wild animals
8. Providing expert training for keepers/staff/conservationists
9. Donations to conservation projects/organisations
10. Scientific research
11. Other ________________________________

Thank you very much for your time, do you have any questions?
Appendix 3: Zoo questionnaire

Zoo:
Role:

Part 1 – Role of the zoo:

When considering the following options, please rank your zoo's top 4 priorities (1 being the highest):

- Caring for the animals in the zoo (Animal welfare)
- Educating the public about conservation issues
- Captive breeding regardless of whether the species are endangered
- Captive breeding of endangered species
- Providing a fun day out for the public
- Reintroductions of endangered species
- Carrying out and supporting conservation projects in the field
- Providing training for keepers/staff/conservationists
- Donations to conservation projects/organisations
- Scientific research
- Other (please state) _______________________________

What area of conservation does your zoo focus on? E.g. habitat, climate change

_____________________________________________________________________________

Part 2 – Perception of UK zoo visitor opinions:

What do you believe the UK public’s perception to be when they consider the zoo's priorities?
Please rank the top 4 following (1 being the highest)

- Caring for the animals in the zoo (Animal welfare)
- Educating the public about conservation issues
- Captive breeding regardless of whether the species are endangered in the wild
- Captive breeding endangered species
- Providing a fun day out for the public
- Animal reintroductions of endangered species
- Carrying out and supporting conservation projects in the field
- Providing training for keepers/staff/conservationists
- Donations to conservation projects/organisations
- Scientific research
- Other (please state) _______________________________

Do you think that the public are aware of conservation projects in your zoo? No Yes
And why? ____________________________________________________________

Thank you very much for your time. Would you like to receive the results of this thesis by email?
- Yes - abstract/thesis (please mark the appropriate option)
Appendix 4: Results tables

Table 10: Demographics of the visitors surveyed at all three sites: ZSL Whipsnade Zoo (n=168), Marwell Wildlife (n=181) and Tring Natural History Museum (n=156). Only residents of the UK are used in this study and therefore this is not shown in the table below.

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<th>Whipsnade</th>
<th>Marwell Wildlife</th>
<th>Tring Museum</th>
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<td>33%</td>
<td>37%</td>
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<tr>
<td>F</td>
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<td>67%</td>
<td>63%</td>
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<td>19%</td>
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<th>Marwell Wildlife</th>
<th>Tring Museum</th>
</tr>
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<td>62%</td>
<td>64%</td>
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<td>30%</td>
<td>19%</td>
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<tr>
<td>Alone</td>
<td>6%</td>
<td>2%</td>
<td>4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Highest education level</th>
<th>Whipsnade</th>
<th>Marwell Wildlife</th>
<th>Tring Museum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary School</td>
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<td>20%</td>
<td>23%</td>
</tr>
<tr>
<td>College/6th Form</td>
<td>34%</td>
<td>31%</td>
<td>27%</td>
</tr>
<tr>
<td>University</td>
<td>26%</td>
<td>38%</td>
<td>37%</td>
</tr>
<tr>
<td>Post-grad</td>
<td>15%</td>
<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
<td>0%</td>
<td>3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Whipsnade</th>
<th>Marwell Wildlife</th>
<th>Tring Museum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>Employed</td>
<td>56%</td>
<td>56%</td>
<td>47%</td>
</tr>
<tr>
<td>Self-employed</td>
<td>7%</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>Retired</td>
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<td>17%</td>
<td>23%</td>
</tr>
<tr>
<td>Part-time</td>
<td>4%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Environmental</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Housewife</td>
<td>10%</td>
<td>10%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Appendix 5: R codes

Example of Kruskal-wallis test code:

VisitorK <- kruskal.test(Member ~ Site, data=VisitorData)
print(VisitorK)

Example of Mann-Whitney U test code:

ProjectsW <- wilcox.test(Projects ~ Site, data = ZooProjects)
print(ProjectsW)

Example of Wilcoxon matched pairs test code:

wilcox.test(ZooPV$ReintroducingZ, ZooPV$ReintroducingV, paired=TRUE)