

## AZA Research Priorities

Association of Zoos & Aquariums  
Research & Technology Committee

Approved by the AZA Board – March 2012

### **Position Summary:**

The application of research findings to meet critical needs is a key to the successful accomplishment of many essential zoo and aquarium functions including animal care, in situ conservation, and guest education. It is the Association of Zoos and Aquariums (AZA) Research and Technology Committee's role to support and advance research within AZA. Key research initiatives focus on the development of sustainable animal collections, animal care and welfare, species and habitat conservation, and conservation education and public engagement. In its function supporting research initiatives, the Committee facilitates communications on the role of science in achieving outcomes pertinent to the missions and operations of AZA-accredited zoos and aquariums, Certified Related Facilities, and Approved Non-Member Participants (AZA institutions). The Committee also coordinates needs from across AZA to direct attention toward primary subject areas where scientific study is needed to ensure the accomplishment and improvement of these essential functions. This document serves to provide an overview of the scope of research programs within AZA institutions and specifically to draw attention to areas where expanded research efforts are necessary to ensure that operational and mission goals are met.

### **Introduction**

Research performed in AZA institutions is critical to meeting the unique and diverse needs of the Association and its member institutions. For many of the species cared for in AZA institutions, there is a paucity of biological, ecological or husbandry information. As a result, many care and management decisions are based on limited information, anecdotal reports and customary practice. Often this information is derived from a limited number of observations, few individuals or is generalized from knowledge of species assumed to be similar. Quantitative as well as qualitative research can help to further inform care and management decisions for many species. Research, however, is not solely limited to collections management. AZA institutions have other unique research skills and abilities beyond the animals that are also central to accomplishing

the conservation mission. The informal educational setting of zoos and aquariums provides opportunities for promoting conservation behaviors to the hundreds of millions of zoo and aquarium visitors, staffs, and suppliers. But to accomplish this goal, it is essential that the wide array of research opportunities receive adequate attention from the Association and its members. The intersection of animal care and visitor education is an example of the unique challenges that are not faced by other types of organizations that focus either on conservation or public learning. To make sound decisions to properly care for animals and to promote a more conservation focused society, an ongoing commitment must be adopted to pursue and integrate the highest quality research across the Association. Additionally, we must share data and findings widely and modify our practices as new information emerges.

The research priorities of AZA institutions should focus primarily on areas that directly influence zoos' and aquariums' ability to reach operational excellence and thus fulfill mission goals. As such, these research priorities are focused on the animals in our care, in situ conservation, and public education. Enhancing efficacy in these areas will promote an ability to meet the numerous conservation goals of AZA and its member institutions.. These goals include sustainability of species, conservation of wild lands and biodiversity, and promoting the development of a conservation conscience as well as a deeper understanding of nature in members of the public. Further, AZA institutions hold numerous species that cannot be studied elsewhere, thus any research that contributes to broadening the base of knowledge about these animals is valuable. Therefore, research at AZA institutions should focus on both basic understanding of the natural world and applications specific to zoo and aquarium operational needs.

A focus on research can also contribute substantially to the public good. By contributing to basic knowledge of species and of biological processes, AZA researchers play a critical role in helping advance knowledge of the value of nature, the importance of individual species and the fundamental natural processes that shape the world.

The following sections offer insight into areas for critical focus by researchers within AZA and the various AZA Committees that work to advance the goals of the Association. By its nature, this document does not identify specific research questions, but offers commentary on how research can help address complex challenges that will face the zoo and aquarium community in the coming decades.

## **Sustainable Animal Collections**

The animal collection is the foundation upon which zoos and aquariums exist, and as

such, it is essential to mission performance and the focus of daily activities. The development of sustainable *ex situ* populations of diverse animal species for the AZA community is desirable because declining wild populations make animals less available and there are increasing difficulties with regulatory issues and costs of animal importation. However, there are significant challenges to producing populations that are sufficient in size, genetic vigor, and diversity across the range of species currently held in AZA member institutions. Research and technology can play a significant role in reducing and overcoming many of the challenges in animal collection sustainability.

### Reproduction

Many populations of species in the care of zoos and aquariums do not reproduce at a rate conducive to long-term sustainability. Research into the causes of low reproductive efficiency could reveal husbandry changes needed to enhance reproductive success. Because reproduction is complex, such research could involve many different disciplines (i.e., behavior, nutrition, health, physiology, sociobiology, etc.), and scientific results leading to improved reproductive rates could move AZA closer to achieving sustainability for many species.

### Genetics and Population Management

Maintenance of genetic diversity within a small population in which some individuals may never contribute genetic material to the population is a significant challenge. The AZA Population Management and Wildlife Contraception centers guide efforts to optimally manage populations based on current population biology. Research and technology such as genome banking, assisted reproduction, and improved animal health have the potential to favorably shift the statistics (mortality rates, birth rates, available founders, longevity, etc.), thereby producing a more promising, long-term stability for many populations. Similarly, progress in the areas of genome resource banking and assisted reproduction could help to overcome two of the greatest challenges AZA faces – insufficient space to hold the animal numbers necessary for sustaining optimal genetic diversity, and the need to transport individual animals for breeding purposes. Because the number of zoos and aquariums grows only very slowly, managing capacity for an optimal number of species represents a central priority for research.

### Epidemiology and Mortality

Despite sufficient reproductive performance, some species under human care might still experience early or high rates of mortality due to specific syndromes or diseases. In addition to common ailments, emerging diseases can also severely jeopardize animal

collections. Epidemiological and clinical research may prove essential in understanding and eventually ameliorating the risks from either common or emerging disease. Similarly, emerging diseases that threaten species on a global scale can severely jeopardize animal collections, regardless of location. Therefore, a proactive research effort supported by technological advances could help alleviate these threats to the long-term sustainability of AZA animal collections.

### **Animal Care and Welfare**

Zoo and aquarium professionals are proven experts in caring for exotic animals. AZA Animal Care Manuals provide a compilation of best practices in animal care, some based on years of expert experience and some emerging from scientific research. Scientific research can reveal the aspects of care that maximize animal health, care, and psychological well-being and thus permit responsible and efficient allocation of limited resources.

### Animal Health

The protection and promotion of animal health is the foundation of good animal care, yet detecting disease is notoriously difficult in exotic animals. Scientific studies of animal health can identify symptoms of illness, test diagnostic tools, or reveal causative factors that threaten the health of individuals or populations. Clinical trials can identify successful aspects of treatment protocols and improved medical technologies can increase the efficiency with which veterinarians and animal care staff are able to secure the health of the diverse populations living in zoo and aquariums. Simultaneously, these trials can contribute more broadly to the understanding and care of exotic animals.

### Nutrition

Animal welfare can only be optimized when animals' nutritional needs are met. Wild animals spend a great deal of time searching for, processing, and consuming the nutritional resources they need to survive. In zoos and aquariums, nutritional resources may consist of regular diet items, food-based enrichment, and plants naturally growing in animals' enclosures. Although the nutritional requirements of some taxonomic groups are well-known, there are still many gaps in this knowledge for other species. There are also unknowns surrounding the proper presentation and composition of food resources for many species. Research into species nutritional needs, and how best to promote species-typical feeding will benefit zoo and aquarium animals by supporting physiological needs and natural feeding rhythms.

## Behavior

Long-term monitoring of animal behavior can identify changes that may potentially indicate compromised health or welfare. Research on ways to increase the efficacy of behavior monitoring can therefore produce information that managers can use to make better decisions about animal care. Hypothesis-driven research on animal behavior can reveal basic information about the diversity of wildlife, elucidate aspects of care and management that support exhibition of species-typical behavior and help to identify key tools for early diagnosis of medical issues.

## Husbandry

The provision of exemplary care so that animals thrive is one of the most important aspects of zoo and aquarium operations. The husbandry expertise of many of the most expert animal care staff remains largely undocumented, when it could contribute to a robust data set that would guide future management of exotic animals. Systematic review, documentation, and distribution of best practices can spread the knowledge of successful husbandry techniques. Hypothesis-driven research can also elucidate specific aspects of care most likely to benefit populations across institutions.

## Psychological Welfare

Ensuring the welfare of individual animals is our moral obligation. Zoo and aquarium professionals care deeply about the animals in their care and aim to provide each individual with the care and environments they need to thrive. Scientific studies of enrichment, cognition, sociality, and exhibit design are essential to the development of new standards of practice that will provide the physical, social, and psychological resources needed to optimize animal welfare for those in the care of zoos and aquariums.

## **Species and Habitat Conservation**

The conservation of wildlife species in their natural habitats is a core component of the missions of AZA member institutions. The practice of modern conservation increasingly relies on empirically derived data to guide initiatives in the field, monitor project progress and assess conservation outcomes. AZA member institutions are uniquely placed to contribute to conservation-relevant research as they operate and support *in situ* conservation programs while simultaneously maintaining important *ex situ* populations of wildlife. Involvement in both *ex situ* and *in situ* in initiatives means that AZA institutions employ staff with a wide range of expertise applicable to the preservation of

wildlife and wild places. We can therefore conduct research that informs conservation efforts both in the field and in the living laboratories of our member zoos and aquariums.

### Reintroduction

The science of reintroducing animals to the wild has evolved significantly in recent years. Though zoo and aquarium professionals recognize that reintroductions are challenging and applicable only under very specific circumstances, there are situations in which reintroduction of animals or reinforcement of existing small populations may be the only way to ensure viable wild populations. Continued research that measures success and helps to develop guidelines for reintroductions can help make these resource intensive initiatives most effective.

### Genetics and Population Modeling

AZA Committees and Animal Programs have extensive experience managing the genetics of, and predicting demographic trends in, small populations. In the wild, many animal populations have become small and fragmented because of anthropogenic impacts and have come under increasingly intensive management. As a result, these populations more resemble zoo populations than their historical precedents. Research into ways to maximize genetic diversity and demographic viability in zoo populations will have progressively more applicability to these challenged wild populations given the accelerating threats these populations face.

### Habitat Preservation and Restoration

The loss of wildlife habitats represents one of the major threats to the survival of species worldwide. Conservation efforts must work to prevent additional loss and restore the ecological functions of areas that have been degraded. Many zoos and aquariums are involved with habitat preservation and restoration projects on a variety of scales. Systematic, science-based documentation of these efforts can help make future work more effective. Research on mapping wildlife habitat, protected area design, monitoring methods and the potential impacts of climate change has already made significant contributions to the conservation of wildlife habitat, and will be increasingly important in the future.

### Wildlife Health

Emerging diseases, such as avian flu and Ebola, have caused significant mortality to animals in their natural habitats and pose serious threats to a number of wildlife

populations. Though disease-related mortality is a natural phenomenon, growing human populations mean that disease processes often have substantially greater impacts than they did in the past. Professionals within AZA have extensive veterinary and epidemiological expertise that can be applied to studies of wildlife health and used to formulate appropriate medical interventions in a wildlife conservation context. In particular, progressively increasing human influence on wildlife habitats means that the threats posed by disease transfer from humans and livestock to wild animals will require greater levels of both veterinary management and human health initiatives.

#### Technologies to Support *In Situ* Conservation

The development of a broad array of technologies has greatly increased the efficacy of *in situ* wildlife conservation efforts. Approaches ranging from non-invasive sampling of DNA to camera trapping and satellite telemetry have answered conservation questions that could not have been addressed using more traditional approaches. Zoos and aquariums have been integral to many such efforts and are ideal places to develop and test these technologies in a controlled setting.

#### Non-native Species

The introduction of non-native species can seriously disrupt ecosystems. The last century has seen the extinction or near-extinction of a number of wildlife taxa as a direct result of invasive species. Many zoos and aquariums are involved at local or regional levels with the control of invasive species. Systematic research into the methods and approaches that most effectively control or eliminate non-native species inform such efforts on a global scale.

### **Conservation Education and Public Engagement**

AZA has developed its Strategic Plan to help achieve its conservation mission. The AZA Strategic Plan emphasizes educating and engaging the public as well as professional and governmental audiences. The first leg of that effort is primarily focused on assessing perceptions and attitudes toward AZA member institutions. Ongoing commitment to this assessment will continue to provide information to guide the work of individual member institutions and AZA staff. The second leg, focused on conservation education and public engagement, represents an important new research focus for AZA and is backed by an actively growing body of literature. In order for AZA to play a role in moving society toward behaviors that will sustain nature, it is necessary to continually understand how people's experiences at zoos and aquariums drive them to perform conservation conscious behaviors. Comparative studies of national attitudes and regional variations are essential to building a critical body of knowledge.

## Learning Theory

Zoos and aquariums are broadly characterized as informal learning environments, but pursue activities that are defined more broadly as formal, informal, and non-formal learning. That is, from teacher-led classes, self-directed experiences with exhibits, and free-choice learning about social norms and conventions of behavior toward nature that are observed and interpreted by guests. In each case, the institutional context and type of experience with live animals reveals a priority focus for advancing learning in new ways and will help further distinguish the unique attributes of zoos and aquariums that directly impact conservation attitudes and behaviors. Studies that investigate guests' responses to zoo and aquarium experiences and evaluate whether these experiences promote the expression of conservation conscious behavior are needed. These studies will help to fine-tune guests' experiences at AZA member institutions to optimize learning opportunities.

## Individual Action

Social science disciplines, including psychology, sociology, anthropology, history, and political science continue to develop theories that have greater explanatory power for how to influence attitudes, increase knowledge, foster more sustainable behaviors and implement conservation-related policies. Conservation psychology is an integration of several of these disciplines. This relatively new field emerged out of the need to guide zoos and aquariums in the development of exhibits that could more effectively promote conservation. Conservation psychology has since established itself as a global meta-discipline within psychology. As conservation psychologists have demonstrated, zoos and aquariums offer unique study sites that can help advance theory by focusing on primary research that produces more effective and efficient methods for encouraging public engagement with conservation. There is need to focus substantial effort to developing and testing emerging theories that draw from outside the zoo and aquarium field in order to develop more effective conservation education and engagement outcomes.

## Social Change

Longitudinal studies of frequent visitors, members, cumulative effects of visiting across the life-course, and how conservation values and behaviors develop in temporary, permanent and volunteer staff, offer a vast new area for understanding how engagement in conservation is nurtured through the zoo and aquarium experience. In parallel, the institutional impact on suppliers, industry, business interests, and political

actors are all under-leveraged areas of research that need prioritization. Zoos and aquariums are highly trusted by their visitors and have substantial support from their communities. To effectively impact social change, it is important to expand the focus of research beyond visitor behavior experiences to larger scale impacts in order to effectively activate public action at a scale that will result in meaningful conservation. It is essential for AZA member institutions and their academic partners to focus on developing education techniques that can activate collective action at a scale that can have meaningful impact on nature.

## **Conclusion**

Research designed to increase the development of sustainable animal collections, animal care and welfare, species and habitat conservation, and conservation education and public engagement is fundamental to the mission of AZA. The examples presented in this white paper are by no means an exhaustive list of the types of research and technology needed to address the challenges associated with achieving all of AZA's strategic objectives. Scientific knowledge and the application of research findings to meet critical needs are the keys to successfully accomplishing many essential zoo and aquarium functions. To fulfill AZA's mission, it is vitally important to fully embrace ongoing scientific inquiry and integrate research in strategic program areas. By building upon a sound base of scientific knowledge and pursuing the priorities identified in this document, stronger practices will be developed and increased conservation impacts will be achieved.

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