

The future of zookeeping and the challenges ahead

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Abstract - A common bond for the world's zookeepers is their passion for wildlife and their commitment to improving professional animal care, animal welfare, and conservation. The modern day zookeeper is expected to have a conservation ethic and expertise in a multitude of tasks, including animal husbandry and educational presentation skills. Today's zookeepers are usually college educated, and they may perform many complex tasks, yet the majority of their day continues to include the basic skills of cleaning and maintaining animal exhibits and holding areas. This paper will examine the evolution of the zookeeping profession, and highlight the challenges and inevitable changes to come.

Additionally, the number of national zookeeper associations continues to increase, and their influence within the zoological industry continues to grow. Zookeeper associations are the catalysts for professional development, and their committees increasingly shape the profession of animal care. The profession of zookeeping must continue to improve and broaden its sphere of influence within the industry. If we are to achieve our professional and conservation goals, the world's zookeeper associations must increase both the growth of their individual associations, and also their collaboration within the international community of zookeeping. Presented in this paper are suggested solutions to the challenges for zookeepers and their professional associations.

Understanding the Animal Care Professional

My professional animal care career began nineteen years ago, but zoos have always been a part of my life. The son of a zoo keeper, my affinity for zoo work began as early as kindergarten when I would accompany my father to work on weekends to help feed the ducks and geese on our zoo's waterfowl lake. The industry has changed incredibly since my father's time as a keeper in the 1960's, and has continued to evolve since the beginning of my career almost two decades ago. To understand the direction of our profession, we need to consider our beginnings.

Circa 1796, Count de Lacepede, a zoologist from France, described his vision for modern day zoos. He described animal exhibits with no bars, no cages, natural plantings, and naturalistic settings with winding paths. He envisioned animal care professionals conducting research, practicing advanced veterinary care, educational strategies, and captive breeding without recruitment from the wild. After more than 200 years, we are finally starting to catch up to the Count.

The keepers of my father's time were mostly male, and very few possessed more than a high school education. By 1979, still only 12.5% of zoo keepers in the U.S. possessed bachelor's degrees (Steenburg, 1979). Although some visionaries existed in the profession, the majority of the keepers of the 1960's were mostly blue collar laborers focused strictly on cleaning, maintaining exhibits, and feeding the animals. Despite this focus, reproduction in the captive animal population was generally higher than it is currently, because zoos of this generation were less restricted in what happened with the animal after it reached maturity, and focused less on genetic diversity and population management. A case could be argued that the baby-boom of zoo animals in this generation resulted in keepers more experienced in reproduction, animal introductions, hand rearing and neonatal care than found in modern day zoos.

Today, the average zoo keeper is female (72.6%) and holds a bachelor's degree or higher (82%) (Thompson & Bunderson, 2005). Modern-day zoo keepers have become the great multi-taskers of the profession, continuing the traditional duties of animal care, but adding to their daily list of chores advanced techniques in animal husbandry, research, conservation, veterinary care, and education. Today's zoo keeper has also assumed some duties once traditionally exclusive to zoo managers, such as captive population management at the local, national, and international level. This is also a great period for information sharing, with the advent of websites, electronic communication, discussion groups, list serves, and similar technology. The answer to a keeper's question is usually just the click of a button away.

One way to gauge the evolution of a profession is to look at the conferences of professional associations. Conferences are the hubs of activity in a profession where the latest achievements are presented. Looking at the conference proceedings of the 1980 AAZK National Conference, the earliest proceedings available, the majority of the papers presented focused on professional development. This would seem reasonable considering AAZK was still a relatively new and evolving association. The members of AAZK were still trying to establish a degree of professionalism and credibility within the industry. By 1990, the focus had shifted to general animal management, with expansive presentation titles such as "Captive Management of Socialized Timber Wolves". In 2008, the majority of papers in the proceedings focused on behavioral husbandry, specifically behavioral enrichment and animal training (operant conditioning). It will be interesting to know where the shift in focus will be in our profession over the next ten or twenty years.

What has not changed over the years is the passion that zoo keepers have for their jobs. Zoo keepers stand out as employees who see their work as a "calling", defined as those who work not merely for economic or socio-emotional reasons, but primarily for passion, ideology, or cause (Thompson & Bunderson, 2006). So unique are zookeepers in their passion for their work, research on the profession has been used in the fields of business management and industrial psychology to describe a neoclassical conceptualization of work as a calling (Thompson & Bunderson, 2006).

(Thompson & Bunderson, 2006) describe zoo keepers as "highly educated and very poorly paid (average annual income of \$24, 640; lowest quartile of U.S. occupations in terms of hourly wage). They state, "...the zookeeping profession is not rich with opportunities for advancement and status", yet competition for zoo keeper positions is high. Zoo keepers tend to look at their work as something they were always meant to do, and most cannot imagine doing something otherwise. The result of passion and calling, low pay and limited opportunity, is a dichotomy that the zoo keeper can express as either an "engaged and supportive organizational citizen, or a worker who is likely to be critical of their organization and conflicted about their job". Personal observation leads me to believe the members of AAZK, the International Congress of Zookeepers (ICZ), and the eight other national zoo keeper associations of the world lean toward the positive side of the dichotomy. Therefore, it would be reasonable to assume that these members will be the driving force in the evolution of our profession into the near and distant future.

In an attempt to describe this future, I will try to examine seven facets of our profession that I believe are most important to the vision, mission, and evolution of our profession and associations. Included are discussion on animal care, animal welfare, safety, the challenges for zookeeper associations, professional development, education, and conservation.

Advancing the Profession of Animal Care

Modern day zoo animal care involves best practices in veterinary science, population management, behavioral management, and husbandry and care of every animal from neonates to geriatrics.

Some professionals may choose a path of generalization while others lean towards specialization. Certain species, such as elephants, seem more deserving of the specialized approach, while multi-species exhibits and geographical themes seem to encourage generalization. However, one of the continuing challenges of captive animal management remains the task of maintaining viable, genetically diverse, and stable populations without recruitment from the wild, and providing them enclosures with appropriate space and features that promote natural behavior.

The idea of zoos and aquariums serving as a modern-day ark, breeding endangered species for eventual reintroduction into the wild has gone the way of the dodo. Conservation biologists almost universally believe the most secure way to save species, and probably the cheapest, is the conserve natural ecosystems (Wilson, 2002). However, that does not diminish the importance of sustainable reproduction for captive populations. In fact, declining wild populations, and increased challenges (governmental, bureaucratic, financial, ethical) to importing wild founders into zoological institutions make captive reproduction even more important.

Ironically, modern day zoos spend as much effort preventing reproduction as they do encouraging it. Today we give close scrutiny to the pairings of individuals, attempting to maximize genetic diversity within our relatively small, captive populations, and give careful consideration to where the offspring will be placed upon maturity. Gone are the days of just opening a transfer door, crossing our fingers that the introduction goes well, results in breeding, and hoping for charismatic babies to bring in the most zoo visitors. Significant resources and staff time go into our reproductive programs. Already zoo keepers play a role in the science as studbook keepers and population managers. However, a disadvantage of our closely scrutinized reproductive programs means fewer neonates. The result has been a new generation of zoo keepers with less expertise in neonatal care, hand rearing, and less experience in observing the behavioral clues associated with successful breeding. As the modern day keeper focuses on training and enrichment, a void has been created in the science of sustainable reproduction. Additionally, despite advancements in veterinary science and animal husbandry, some species have never optimally reproduced in captive environments, such as Sumatran rhinos, Komodo dragons, and African elephants, to name a few.

The answer to maintaining sustainable captive populations does not rest in the science of artificial insemination, cryopreservation of gametes, embryo transfer, and cloning (Wilson, 2002, Murphy, 2008). While these methods may show some promise and certainly attract media attention, they require substantial funding and staff time. The best, most cost-effective methods for reproduction remain providing our animals with exhibits that provide the space and features that encourage natural behaviors and a keeper staff trained in observing and scientifically recording the behavioral clues of reproduction (Murphy, 2008). Additionally, future keepers must expand their knowledge in areas of basic vet care, nutrition, neonatal care, hand rearing, and behavioral observation. Perhaps less glamorous than enrichment and training, this subject matter is no less important.

Animal Welfare

Providing our captive populations with adequate space and exhibit features is not just an important aspect of reproductive science, it is the very basis of maintaining physically and psychologically healthy animals. Despite advancements in animal husbandry, veterinary care, and captive management, too many animals in too many zoos remain in enclosures that do not meet the recommended guidelines of our husbandry manuals. Two hundred years later, we have still failed to fully institute the vision of Count de Lacepede. Every elephant that walks an exhibit too small in size, every primate isolated without the social structure of its conspecifics, and every cat that grooms to excess in response to known and unknown stressors is an indicator of our failing as an industry to provide the best possible care for the animals under our charge.

Zoo professionals are quick to dismiss the intentions of animal rights groups, and admittedly many of these groups bend the facts and use destructive tactics. However, a benefit to animal rights groups is they force our industry to turn a critical eye upon itself and face some inconvenient truths. Despite our conferences, husbandry workshops, TAGs, and husbandry manuals, we still have a long way to go in providing ample space, natural environments, naturally-sized groupings of species, and encouraging all of the natural behaviors of a viable population. Therefore, it is essential that the professional zoo keeper associations of the world, including AAZK and the ICZ, become more vocal, visible, active, and mobilized in the animal management initiatives and contemporary issues of our industry, not as advocates of animal rights, but as subject matter experts in the many facets of animal welfare.

The challenge of providing all of the components of animal welfare is greatest in the zoos of the developing world. Ironically, these zoos often occur in countries with the highest biodiversity and most dramatic declines in wildlife populations (Wilson, 2002, Walker & Dick, 2009). Associated with the loss of biodiversity are usually large human populations and poverty. Zoos of these regions usually possess the least amount of resources, and their keepers are typically less educated than in the developed world. Outreach, funding and training by the professional zoo and zoo keeper associations will be essential to providing zoos of the developing world the resources needed to improve animal welfare (Walker and Dick, 2009).

Safety

Ed Hansen, Executive Director of AAZK, Inc., and risk manager by profession, wrote an extremely relevant and insightful essay in the May, 2007 issue of the *Animal Keepers' Forum* entitled *Safety in the Animal Care Profession*. Hansen prefaces by stating an average of ten exotic animal caretakers suffer a fatal injury each year. While many of these fatalities do not occur in accredited institutions, we can all agree that just one fatality is one too many, no matter where it occurs. Hansen lays out a plan for improving safety in the industry, focusing on three main players, employees, facilities, and the oversight. I completely support and endorse Hansen's plan. The AAZK Board of Directors has discussed the issue of safety at length. We recognize there is a huge safety void in our industry that needs filled and AAZK is actively working towards helping fill that void.

In an effort to promote safe practice, here are my Top 10 ideas for improving safety in the animal care profession.

1. Keepers need to be aware of the pitfalls that are related to working memory, mental models, and risk homeostasis (Gonzales, 2003, Good, 2008). Knowing some of the factors that can lead to mistakes can help us prevent them.
2. Keepers, facilities, AZA, WAZA, ICZ and the AAZK all need to work proactively in regards to safety, rather than merely reacting. We may put effort into animal escape drills, but let's put just as much energy into teaching our staffs how to prevent the animal from escaping in the first place. Venomous animal bite drills are important, but let's give our staffs the skills and training they need to reduce the likelihood of bites. Additional training costs time and money, but the benefits of preventing a crisis before it ever happens are priceless.
3. Each facility needs to have a written safety program that serves as a living document that is constantly edited and updated. It cannot collect dust on a shelf, utilized only when catastrophe has already occurred. Employees need to be required to know the details of this document and review any changes or additions to the document.

4. Keepers and managers must work together in performing a complete job hazard assessment of their facilities and practices.
5. Once safety issues are identified, facilities must respond quickly to eliminating or improving the safety issue. I have heard of keepers purposely leaving safety issues visible during USDA inspections because they know a written violation is the only thing that will result in a repair. I have also heard of keepers who have stopped writing work orders for safety related maintenance, because they have lost faith in their facility's commitment to respond to these issues. A rapid and complete response to safety related issues is vital to our institutions.
6. Zoological institutions must create a culture that promotes communication about safety issues. Employees should not feel reluctant to express safety concerns or fear repercussions. Safety should be a primary focus at every level, in every department of a zoo facility.
7. Institutions should have an initial and annual safety training process. Keepers need to realize its importance, embrace it, and work to improve it.
8. AZA and WAZA must provide important oversight of safety in accredited institutions. Safety must become a primary focus in the accreditation process. Safety tracking and risk management should be a focus within institutions, but should also be a focus of the AZA's and WAZA's oversight.
9. AAZK and ICZ will work with AZA, WAZA, and other organizations to promote safety and fill any safety void in our profession. Keeper safety guidelines should be developed by these oversights and adopted at the institutional level.
10. Institutions need to look at the workloads they are placing upon their animal care staff. In some cases, keepers are being asked to do so much, it jeopardizes the quality and safety related to their work.

The Challenges Ahead for Zoo Keeper Associations

One of the main challenges for all zoo keeper associations is simply maintaining their membership and financial stability. Zoo keepers typically do not have a lot of extra money for professional memberships, so events such as economic recessions usually hit our associations hard in the form of lost memberships. Additionally, high turnover rates within the profession, 14.5% annually (Thompson & Bunderson, 2005), make long term memberships a challenge. The nine professional zoo keeper associations of the world, as well as the ICZ, need to continue to work hard in increasing and improving the benefits to their members, enhance the visibility, recognition, and credibility of their work within the zoo industry, increase their fundraising power without significantly increasing membership fees, and enhancing their initiatives in professional development, networking, collaboration, conservation, information-sharing and networking. Maintaining financial and membership stability will be best accomplished by establishing our national associations and the ICZ as the premier organizations for the professional zoo keeper.

Strategies for improvement and meeting our challenges include:

- Strategic planning for short-term and long-term goals and objectives. Set both national and global agendas for AAZK and ICZ. Secure financial growth and stability.
- Improve our marketing, visibility, recognition, and credibility within and beyond the zoo industry
- Expand our professional development and continuing education initiatives
- Continue and expand our support of conservation both financially and in-kind, and development of conservation partnerships with compatible organizations

- Establish our associations as the subject matter experts in animal care and animal welfare and establish best practice and standardization of zookeeping skills, and share expertise through outreach in developing countries. Promote the highest standards of animal care and animal welfare.
- Create a network and voice of a global community of zoo keepers.
- Develop partnerships with established zoo associations and special interest associations.
- Reaffirm our commitment to frontline education of zoo visitors and local communities.
- Continue to improve animal husbandry and welfare by increasing our support of research, information sharing, networking, and collaboration throughout the zoo and conservation industries.
- Establish priorities and identify areas of greatest need.
- Inform, Inspire, Facilitate, Mobilize, and Empower our membership towards our goals and objectives. Identify and support leaders within our associations.
- Be inclusive and sensitive to the cultural, philosophical, financial, and demographical diversity within the international zoo community.
- Promote sustainability within our associations, the zoo industry, and beyond.

Another threat to our national associations and the ICZ is competition for membership with other zoo-related organizations and special interest groups. Just one generation ago, zoo professionals in the U.S. had mainly two choices for their membership dollars, the former American Association of Zoological Parks and Aquariums (AAZPA) and AAZK. Today, special interest associations focus on training, enrichment, specific species, specific taxa, and also include local, regional, national, and international interest groups. This trend has not been isolated to the zoo industry. In 1956, there were 985 humanitarian or environmental nongovernmental organizations (NGOs) in the U.S. By 1996 the number had increased to over 20,000 (Wilson, 2002). Everyone with a special interest, from bats to elephants to insects, wants a group to call their own. Our associations must continue to collaborate with the special interest groups and our conservation partners, while establishing and maintaining our status as the premier associations for professional zoo keepers. Furthermore, the ICZ will continue to assist keepers in regions without a national zoo keeper association form their own national associations. Assistance may include providing information, advice, and samples of documents such as By-laws, and possible representation on the Steering Committee of the ICZ.

Professional Development

The AAZK and ICZ will continue to promote the highest standards of animal care and animal welfare through our professional development programs. Best practice and the standardization of zookeeping skills will be established through zoo keeper certification, workshops, conferences, and by information sharing via our journals, newsletters, and websites. On-line classes, instruction, and webinars on our websites will help meet the challenges associated with the costs and logistics of traditional classes and related travel.

Proper knowledge, training, and continuing education are paramount to successful animal care. Modern day zoos require sophisticated zoo keepers to achieve best practice and the highest standards of animal care. Our professional development programs will be measurable, assure accountability towards best practice, place a high value on standardized knowledge, and will be a method to prove to our industry's critics that professional zoo keepers are achieving the highest standards of animal care (Cisneros, 2009). Our professional development programs will quantify animal care skills and knowledge, standardize information, increase access to educational materials, and recognize professional achievement (Cisneros, 2009). Zoo directors who send their keeper staff to AAZK and ICZ conferences will be assured that they are getting optimum educational value for their conference and training budget.

Professional development and continuing education will be featured in:

- AAZK and ICZ Conferences
- AAZK Advances in Animal Keeping Course
- Curriculum-based AAZK Workshop Tracks
- Special non-conference workshops (i.e. AAZK Venomous Animal Workshop)
- AAZK/Polar Bears International Leadership Camp
- AAZK and ICZ publications
- AAZK and ICZ websites
- Zoo Technology Textbook

Education

The AAZK and ICZ will reaffirm their commitment to educating zoo visitors and local communities using scientifically-based conservation messages. Education has become one of the top priorities of our industry, and in many of our institutions, zoo keepers are considered the front line educator. We know that our institutions provide the urban public opportunities to learn about endangered species, conservation issues, and even the chance to see a farm animal for the very first time. We also know the average zoo visitor considers the conservation messages conveyed by zoo keepers to be of the most credible and preferred methods for learning about these topics during their visit. The best zoo keepers take the science of our profession and convey it in a manner that is fun, informative, and personal to the average visitor. Part of the mission for both the AAZK and ICZ is to provide you with resources and a forum to support your efforts in conservation education.

Today, for the first time in our planet's history, more human beings live in urban environments than in rural environments. This shift is also associated with increased human populations, pollution, habitat destruction, urban sprawl, and energy use (Robert Bateman Get to Know Program, 2009). In short, these urban populations have been described as disengaged from the natural environment, and what little nature they know is depleted. Recent studies show that urban youth spend little or no time in nature and their condition, which includes diminished use of the senses, attention difficulties, and higher rates of physical and emotional illness, has been described by author Richard Louv as *Nature Deficit Disorder* (Louv, 2005).

Zoos, aquariums, and nature centers can help fill the void created by nature deficit disorder. Urban children lack personal connection to nature, and zoo keepers, acting as frontline educators, can lead education initiatives related to sustainability, conservation ethics, and appreciation for nature. The challenge for zoo keepers, educators, and zoological institutions now and in the future will be providing current, informative, retainable, action-shaping, and fun education programs. A large part of the challenge will be implementing and achieving our goals in the limited time and short attention spans we have access to in zoo visitors.

Conservation

We currently live during a period in time of the greatest loss of biodiversity our planet has seen since dinosaurs walked Earth. More than six billion humans exist on Earth, with the number expected to peak between eight and ten billion between the middle and latter part of this century (Wilson, 2002). The vast majority of the human race is very poor, with nearly one billion humans believed to be living on the edge of starvation (Wilson, 2002). Our use of natural resources is not sustainable. Recent studies indicate the human population exceeded Earth's sustainable capacity by 1.4% by the year 2000 (Wilson, 2002). The incursive forces of habitat destruction, invasive species, exponential growth of the human species, pollution, and overharvesting has nature fighting a losing battle.

Notable to the zoo keeper and anyone with an affinity for our planet's biodiversity, is the alarming rate of species extinction that currently exists. There is no phenomenon that better illustrates the current, rapid loss of animal species than the crisis of declining amphibians. Habitat destruction, pollution, increased UV-B radiation, invasive species, and the chytrid fungus have created a global crisis of amphibian loss. Unfortunately, the threat of extinction is not limited to amphibians. It is estimated that one in four of Earth's mammal species, and one in eight of our bird species are currently in danger of extinction (Wilson, 2002). Furthermore, estimates predict that if not mitigated, the current rate of extinction could wipe out one fifth of all plants and animal species on Earth by 2030 (Wilson, 2002). According to Wilson (2002), the great challenge for humanity, in our lifetimes, will be feeding billions of new humans, while attempting to save the rest of our planet at the same time.

The task ahead for zoo keepers and zoological institutions is to mitigate the current wave of extinction through our conservation and captive breeding programs. Greater collaboration will be needed within the international zoo community, including the sharing of resources and expertise. As current zoo keepers move on in their careers to the positions of curator, director, or the population manager for a species, difficult and painstaking decisions will need to be made. Our captive populations cannot save every species, so which do we choose? If given the choice of the Philippine eagle, Spix's macaw, or the Hawaiian crow, which do we choose to save? As we reduce the number of species in our collections in an effort to provide adequate space and populations, how do we choose which species to make room for? Important considerations about conservation status, reintroduction potential, viability of captive and wild populations, scientific research potential, exhibit value, husbandry expertise, educational value, availability of founders, taxonomic uniqueness, and habitat viability will be required. Zoo keepers and their professional associations need to be part of the decision making process, because keepers are an essential part of establishing and maintaining sustainable captive populations.

Of course, our captive breeding programs cannot save the majority of Earth's biodiversity. Therefore, the greater task for zoo keepers and zoological institutions is to change perspectives toward nature, and create personal connections to wildlife through our education programs. Education will be a major priority for zoos and aquariums, both inside the zoo and within our communities. Our institutions will become community centers for conservation, sustainability, and getting close to nature. Zoo keepers and aquarists will step up as leading advocates and ambassadors for the conservation of species and entire ecosystems. Zoo keepers and zoological institutions need to have a major presence in the contemporary conservation issues of our time.

A Final Word

The future of professional animal care is bright, yet challenging, and our profession is constantly supplemented with new, passionate, and intelligent individuals. However, what we need most in the profession is more coaches, mentors, and leaders. We need them within our zoos, within our professional associations, and throughout the zoo and conservation industries. Zoo keepers can make great leaders. They are passionate about their work, highly motivated, mission based, internally nurturing, continual learners, and hopefully team oriented. Watch and learn from leaders you respect. Recognize your weaknesses and plan to minimize them. Hone your communication skills. Collaborate with co-workers and within your professional associations. Remember that change is constant, embrace it, and work to maximize positive outcomes. Most importantly, take initiative, and make a positive impact within your zoo, your professional associations, and in all of your animal care, education, and conservation endeavors.

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