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CARING FOR WILDLIFE

THE WORLD ZOO AND AQUARIUM ANIMAL WELFARE STRATEGY



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MISSION STATEMENT

*WAZA is the voice of a global community of
zoos and aquariums and a catalyst for their
joint conservation action*

CREDITS

Title

*Caring for Wildlife:
The World Zoo and Aquarium Animal Welfare Strategy*

Editors

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Publisher

World Association of Zoos and Aquariums (WAZA) Executive Office,
Gland, Switzerland

Layout and Design

Megan Farias, Houston Zoo, TX, USA

Cover Photography

African wild dog (*Lycaon pictus*) | © Jonathan Heger
Yellow mongoose (*Cynictis penicillata*) | © Nicole Gusset-Burgener

Print

Chas. P. Young, Houston, TX, USA



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Citation

Mellor, D. J., Hunt, S. & Gusset, M. (eds) (2015) *Caring for Wildlife:
The World Zoo and Aquarium Animal Welfare Strategy*. Gland: WAZA
Executive Office, 87 pp.

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978-2-8399-1695-0

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In reading the *World Zoo and Aquarium Animal Welfare Strategy*, I was struck by how it fits in the historical development of ethical concerns for animals. These concerns can be seen as falling roughly into three stages.

First, in the 1700s and 1800s, at a time when blood sports and blatant acts of cruelty remained common and perfectly legal, reformers sought to stamp out cruelty as part of a broader programme of social progress. This led to the criminalising of deliberate cruelty and the banning of recreations such as bull-baiting and dog-fighting in many countries.

Then during the 1900s, with the large-scale institutionalised use of animals in food production and biomedical research, the key problem of animal ethics was perceived not as acts of cruelty, but as the use of animals for utilitarian purposes in ways that resulted in deprivation and curtailment of their freedom. This gave rise to radical ideas, such as animal rights and animal liberation, which opposed all ownership and use of animals. It also gave rise to concerns about the welfare or 'quality of life' of animals in human care, and to a combination of scientific and philosophical attempts to understand what constitutes a good life for animals.

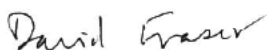
In the current century, although cruelty persists, and although huge numbers of animals continue to be used for food and other purposes, we have arguably moved into a third stage. We now see that the burgeoning human population is having vast, unintended effects on the non-human inhabitants of the planet. We affect animals by destroying their habitat, polluting their environment, introducing invasive species into their ecological systems, building structures in flight-paths, tilling the land, cutting trees, driving cars, burning fuel, and on and on. To date, much of the discussion of these issues has focused on 'conservation', which deals at the level of populations and species. However, we now recognise that these same human activities cause harm to individual animals on a vast scale, making these activities a major concern for the welfare of individuals as well as conservation of species and populations.

Historically, there has been a lack of communication between the conservation and animal welfare movements, and even occasional conflicts. For one thing, conservation was often championed by people who wanted to preserve wild populations for activities, especially hunting and fishing, that were questioned by animal welfarists and opposed by liberationists. And conservation-oriented activities such as pest control and the reintroduction of animals often resulted in harms to the animals involved. Clearly, however, in a century when so many human activities lead to both conservation and animal welfare problems, there are far more shared concerns between the two fields than there are differences. What is needed is a mentality and plan of action that will combine the momentum of both conservation and animal welfare to confront their common problems.

Zoos and aquariums play important and complex roles in this arena. On the one hand, they are opposed in principle by animal liberationists, if only because they hold animals in 'captivity'. Secondly, they are a focus of animal welfare concern because they can provide either good or bad quality of life for their resident animals, depending on the species, the staff and the institution. Good institutions have responded to these concerns with programmes of research, innovation and monitoring designed to improve the welfare of animals in their care. Thirdly, many zoos and aquariums engage in conservation activities; if these are chosen and executed with animal welfare in mind, they have the potential to enhance the welfare of wild animals as well as helping to conserve species and populations. Finally, zoos and aquariums communicate with large numbers of people and thus have the potential to sensitise and mobilise people to act in ways that support both the welfare and conservation of free-living animals.

The *World Zoo and Aquarium Animal Welfare Strategy* is a significant and timely milestone. It responds to concerns over the welfare of zoo and aquarium animals by providing a structured approach for assessing and managing animal welfare through accreditation, staff awareness, exhibit design and environmental enrichment. But it goes further by incorporating animal welfare into the conservation activities of zoos and aquariums, such as breeding programmes and programmes for the reintroduction of animals into the wild. It also includes animal welfare in the public communication activities of zoos and aquariums, and thus encourages institutions to help the public appreciate the need to protect free-living wildlife for both conservation and animal welfare purposes.

Society has few institutions that make the welfare of wild animals a key concern. By following the *World Zoo and Aquarium Animal Welfare Strategy*, zoos and aquariums can fill a much-needed role.



Professor David Fraser

Animal Welfare Program, University of British Columbia, Vancouver, BC, Canada

International Fund for Animal Welfare (IFAW)

The *World Zoo and Aquarium Animal Welfare Strategy* makes impressive reading. It is clear that considerable thought has gone into its preparation and the animal welfare principles and recommendations are well researched and thorough. Whilst IFAW believes that wildlife belongs in the wild, we recognise that wild animals are kept in human care for a variety of reasons. In our view, the primary consideration should be for the welfare of the animals in question. For this reason, WAZA's animal welfare initiative is especially important and, when implemented, should improve the lives of zoo and aquarium animals all over the world. We wish WAZA well in this endeavour.

Humane Society International (HSI)

Around the world many thousands of zoos and aquariums operate with facilities, procedures and philosophies that do not meet even basic standards of animal welfare. The *World Zoo and Aquarium Animal Welfare Strategy* provides practical, scientific and management guidance to promote industry reform in a number of critical areas. HSI welcomes WAZA's leadership, and hopes to see its efforts create meaningful change for zoo and aquarium animals, both within and beyond WAZA's membership.

World Animal Protection

Zoos and aquariums have the potential to play a vital role in the conservation of threatened wild species, if they are managed correctly and according to best practice. The *World Zoo and Aquarium Animal Welfare Strategy* recognises the vital importance of incorporating animal welfare considerations into the management plans of modern zoos and aquariums. World Animal Protection welcomes WAZA's bold transparent approach and hopes that its efforts will result in positive change for wild animals in zoos and aquariums across the globe.

FOUR PAWS

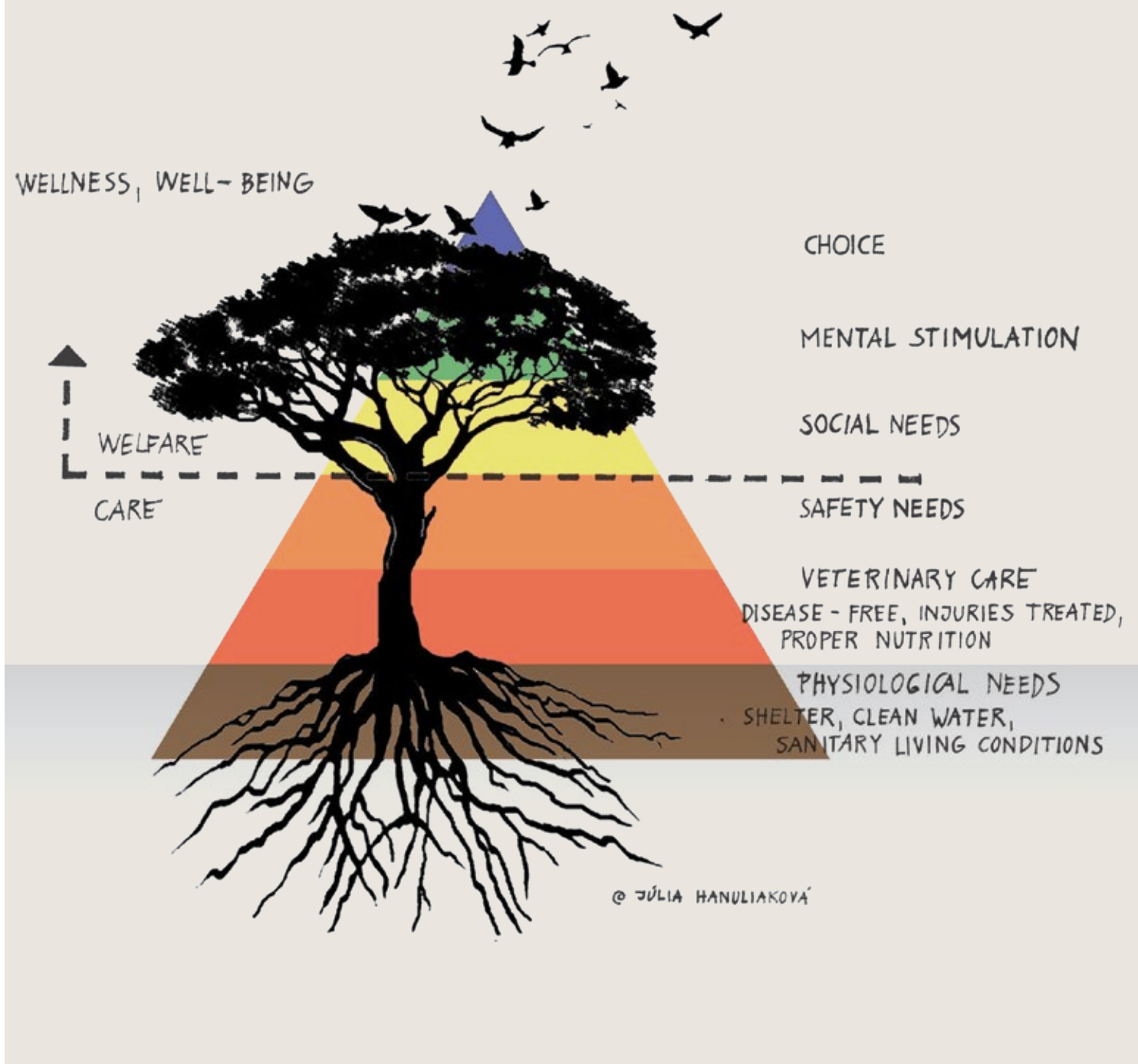
FOUR PAWS actively aims for animal welfare in zoos to be progressively improved. Therefore, we greatly appreciate the commitment of WAZA to engage in the implementation of higher standards for the well-being of animals in zoos and aquariums, and we welcome the *World Zoo and Aquarium Animal Welfare Strategy*. We trust that proper implementation of the guidelines will contribute to improving the well-being of animals in zoos and aquariums and will positively influence change within the global zoo community.

Royal Society for the Prevention of Cruelty to Animals (RSPCA)

Keeping animals in human care comes with great responsibility, not just in terms of preventing suffering but also ensuring that animals experience a good quality of life. The RSPCA commends WAZA for recognising this in the *World Zoo and Aquarium Animal Welfare Strategy* and for providing practical guidance to zoos and aquariums about how to achieve this. The RSPCA hopes to see zoos and aquariums around the world using this Strategy to achieve genuine improvements to the lives of the animals they keep.

Wild Welfare

Wild Welfare strongly supports the *World Zoo and Aquarium Animal Welfare Strategy*. This will become the blueprint around which all zoos and aquariums should direct their efforts in continually improving the care and well-being of their animals. For zoos and aquariums to justify their existence, they must not only present animals in ways that encourage their audiences to respect, understand and protect the natural world, but also demonstrate that they are providing the highest welfare standards possible. This Strategy sets the pace for all zoos and aquariums to follow.



MASLOW'S HIERARCHY OF NEEDS

We overlay Maslow's hierarchy of needs pyramid with a tree to express the aspiration of the *World Zoo and Aquarium Animal Welfare Strategy*; that is, to direct animal welfare attention towards the highest categories of Maslow's pyramid of wellness and well-being. The tree's roots represent the critical foundational requirements for survival, including nutrition systems, understood through experience and science. In the trunk, health care meets the animals' physical and safety needs. The crown is the site of the most varied and complex welfare-related activities that the best zoo and aquarium design and management would make available to the animals. The birds taking flight from the tree represent perhaps an ideal of zoos and aquariums—retaining and encouraging natural abilities. As a tree provides a complex habitat for other species, a zoo or aquarium can foster the welfare of animals beyond its own confines.



SMITHSONIAN'S NATIONAL ZOOLOGICAL PARK, DC, USA
A zoo staff member provides training to encourage natural behaviour in a sea lion.

“

We believe that zoos and aquariums have a responsibility to achieve high standards of animal welfare in support of their goals as modern conservation organisations.

”

In recent years, there have been significant advances in knowledge about animals and animal welfare science. This has resulted in big changes in modern zoos and aquariums. Whereas zoos and aquariums of the past were places where animals were ‘displayed’ for the pleasure of visitors, today’s zoos and aquariums must be centres for animal welfare. They must ensure that the conditions for animals in their care are the best that can be delivered. As scientific knowledge about animals grows, this must be consistently applied.

While there continue to be challenges in the global implementation of animal welfare standards; with different attitudes, societal expectations and varied jurisdictional frameworks and legislation; all zoos and aquariums can take a significant stance to improve the lives of animals in their care. The *World Zoo and Aquarium Animal Welfare Strategy* recommends that zoos and aquariums should apply a simple welfare model—the ‘Five Domains’—and make an ongoing commitment to animal welfare in all operations and to all animals in their care. The Strategy recommends continued education and training of staff in animal welfare, and a commitment to animal welfare research, to applying animal welfare knowledge to exhibit design and to being leading centres for animal welfare.

While the goal of the World Association of Zoos and Aquariums (WAZA) is collective conservation action, the Strategy affirms WAZA’s commitment to leading its members and colleague zoos and aquariums to build expertise, leadership and capacity in animal welfare.

The World Zoo and Aquarium Animal Welfare Strategy provides guidance on how to establish and maintain acceptable animal welfare standards and related best practice. It outlines the animal welfare measures and conduct expected from WAZA members and it supports the ongoing evolution of positive animal welfare conduct within the wider zoo and aquarium community.

In doing this, WAZA calls on its members and all zoos and aquariums to:

- strive to achieve high welfare standards for the animals in their care;
- be animal welfare leaders, advocates and authoritative advisers; and
- provide environments that focus on the animals’ physical and behavioural needs.

Chapter 1: Animal Welfare and its Assessment

1. Develop an animal welfare charter for your organisation that reflects a clear commitment to animal welfare principles.
2. Cater to the physical and behavioural needs of animals when providing for their care. This includes creating opportunities for them to benefit from rewarding challenges and choices whenever that is practically feasible.
3. Seek to continuously improve animal welfare understanding to better promote positive welfare states in all species held by your organisation.
4. Implement science-based animal welfare monitoring processes that use indices aligned with the animals' physical/functional states and behavioural activities.
5. Use the 'Five Domains' model to understand and assess different animal welfare states.
6. Promote knowledge and understanding of animal welfare and its management within the wider community.

Chapter 2: Monitoring and Management of Animal Welfare

1. Make animal welfare-based accreditation a priority. This may be through your regional zoo and aquarium association or by adopting welfare standards and monitoring used by other regions or countries.
2. Make sure that animal care staff have relevant scientific training and expertise, keep abreast of latest developments in animal health and welfare monitoring methods, and link with other professional bodies and organisations to share knowledge and best practice.
3. Develop and maintain a staff culture that practices regular reporting and monitoring of animals' behaviour and health. Maintain and keep updated all associated animal records.
4. Using up-to-date animal welfare research, collaborate with other institutions to establish 'baseline' animal welfare data for individual animals and groups to enable comparison with any new data.
5. Scrutinise how animals are transported and address any potential animal welfare risks. Develop plans for moving animals that also abide by any relevant national and international standards. Require that animal welfare standards and practices of receiving institutions are checked and seen to be at or above those outlined in this Strategy and regional zoo and aquarium associations' welfare policies.
6. Employ veterinarians, biologists, welfare scientists and behavioural experts with experience in a broad range of taxa to ensure high standards of animal welfare and health care, including preventative health care interventions.
7. With regard to whole-of-life care, develop comprehensive animal health plans and, if needed, specialist policies that include catering to the special needs of very young, ill, injured and geriatric animals.
8. Put plans in place to prevent and address animal disease outbreaks, including disease transmission between animals and people, and ensure that quarantine protocols are available when required.

Chapter 3: Environmental Enrichment

1. Build staff skills, internal culture and commitment to embed enrichment strategies and activities into the daily management of all animals in your care. Regularly review these strategies and activities and provide ongoing staff training in this area.
2. Introduce different enrichments that provide challenges, choices and comfort to animals to maximise their psychological health. Change them when appropriate and design them to stimulate a diversity of species-specific natural behaviours.
3. Use positive reinforcement as an enrichment and training tool.
4. Evaluate enrichment success and failures and share enrichment successes and failures with other zoos and aquariums to improve your own and other's enrichment knowledge and activities.
5. Incorporate environmental enrichment into exhibit design and upgrades.
6. Share enrichment stories with visitors to broaden understanding and education of animal biology and welfare.
7. Use specific, target-orientated enrichment designed to meet specific behavioural needs.

Chapter 4: Exhibit Design

1. Define environmental characteristics that support species-specific good animal welfare and include these as primary criteria of all exhibit design and upgrades; ensure species-appropriate features based on up-to-date, science-based advice.
2. Seek to ensure that the animals' physical and behavioural needs are met. Provide environmental challenges that encourage curiosity and engagement, as well as choice of access to natural elements, including seasonal changes. Also accommodate the changing needs of an animal or group of animals over time.
3. Ensure that exhibits allow opportunities for separation of animals as required for animal welfare management.
4. Ensure that staff members can safely and easily engage in maintenance, care and training to enable animals to lead rich and fulfilling lives without undue stress or injury.
5. Institute monitoring to assess the quality of exhibit design. Find creative solutions and share them with others.
6. Explain animal welfare on exhibits and provide visitors with information about personal actions they can take to improve the welfare of animals anywhere.
7. Consider the provision of features that allow the animals' continuous species-appropriate multiple choices or control over their environment.

Chapter 5: Breeding Programmes and Collection Planning

1. Introduce and follow breeding plans and species management recommendations that align with overall species conservation plans and seek to minimise negative welfare consequences for animals.
2. Facilitate positive welfare management during breeding events through using, for example, oestrus monitoring, animal separations and ongoing skilled observation.
3. Use professional staff, by external specialist input if necessary, to oversee breeding-related animal welfare issues.
4. When breeding animals for release, give specific attention to balancing animal welfare with survival in the wild and replenishment of wild populations.
5. Develop and use a clear euthanasia policy, which outlines the circumstances for the use of euthanasia and those who are mandated to perform it.
6. Ensure that species-specific animal welfare considerations are fully integrated into long-term collection planning that guarantees animals can be provided with whole-of-life care and a high level of welfare throughout their lives.
7. Ensure that in considering inward animal transactions, all animals come from sources that do not impact on wild populations or reinforce commercial production of wild animals where animal welfare may be compromised.

Chapter 6: Conservation Welfare

1. Establish animal welfare as a component in all conservation activities and projects supported by your organisation.
2. Work with partner field conservation organisations and collaborate on animal welfare knowledge and skills that are relevant to their field operations, including, for example, reintroduction projects.
3. Evaluate whether the animal welfare implications of management interventions are outweighed by their conservation benefits.
4. Build understanding of the importance of integrated species conservation frameworks that include assessing animal welfare.
5. Make sure that in your conservation work, and the work of your conservation partners, the review of an individual's needs and the promotion of positive animal welfare is considered at all times.

Chapter 7: Animal Welfare Research

1. Prioritise animal welfare and welfare monitoring as areas for research in collaboration with universities, research bodies and other zoological institutions.
2. Continue to use and apply findings based on sound scientific research to support good animal welfare in zoo and aquarium management.
3. Use an animal ethics, welfare and research committee, or similar entity, with external representation to consider and oversee research activities and foster increased scientific rigour across your operations.

4. Develop a research policy and research protocols to ensure that in all research involving animals, any potential animal welfare concerns are clearly identified and any compromise is minimised, transient and justified in terms of the objectives of the research.
5. Actively work to assist research partners to promote positive animal welfare states.
6. Encourage conservation medicine as a research-based area of activity within your organisation to enhance animal welfare generally and conservation welfare in particular.

Chapter 8: Partnerships in Animal Welfare

1. Become a recognised centre for animal welfare expertise and assist and advise other organisations on animal welfare.
2. Make sure that all relevant staff, including your animal management and veterinary staff members, closely collaborate and are up to date with professional standards of animal health and welfare.
3. Collaborate and partner with universities, research bodies and other zoological institutions to further understanding of animal welfare states and animal sentience.
4. Partner with animal welfare organisations and external animal welfare experts, through representation on animal ethics and welfare committees, or similar entities, in reviewing animal welfare in your organisation.
5. Partner or 'twin' with zoological institutions that require guidance to achieve positive welfare outcomes for the animals in their care. This can be through staff exchanges, training opportunities, exchange of procedures or funding grants.

Chapter 9: Engagement and Interaction with Visitors

1. Avoid using animals in any interactive experiences when their welfare may be compromised.
2. Undertake specific animal welfare evaluations and ongoing monitoring of all individual animals being used in interactive experiences. Withdraw animals from such activities if behavioural and other indices of distress are elevated.
3. Ensure that the messaging that accompanies all interactive experiences and the intent of any related presentations is to raise conservation awareness and/or achieve conservation outcomes.
4. Do not undertake, contribute or participate in animal shows, displays or interactive experiences where animals perform unnatural behaviours. Species conservation should be the overriding message and/or purpose.
5. Set in place processes to ensure that all animals in your zoo or aquarium are treated with respect. This includes how animals are depicted and presented.
6. Explain, via talks, signage and/or interpretation, how animal welfare improvements have been made in your organisation.
7. Access and use the body of knowledge and expertise that underlies the evaluation of the effectiveness of environmental education when considering developing interactive experiences to ensure that benefits are realised.

The development of this Strategy both reflects and contributes to other initiatives designed to improve the worldwide understanding of animal welfare and its enhancement.

The global relevance of the development of the *World Zoo and Aquarium Animal Welfare Strategy* by the World Association of Zoos and Aquariums (WAZA) accords with a marked increase in international interest in animal welfare and its management, which has occurred during the last 25 years, and especially during the last 15 years. There are numerous examples of transnational, regional and national activities aimed at improving animal welfare, some of which are enumerated below.

First, the global animal welfare initiative of the World Organisation for Animal Health (OIE) instigated in 2001, the subsequent formulation of 14 animal welfare standards for different species or animal-focused activities and, as each standard was completed, its unanimous adoption by the full membership of OIE, which currently numbers 180 countries. Note also the Food and Agriculture Organisation of the United Nations (FAO) animal welfare capacity building activities, the development by the International Organization for Standardization (ISO) of Animal Welfare Management Technical Specifications, and global private sector leadership by organisations such as Safe Supply of Affordable Food Everywhere (SSAFE), all designed to embed animal welfare into good practice processes.

Likewise, international and national veterinary associations as well as international organisations representing different farming sectors have adopted animal welfare policies, and transnational food processing and distribution companies are increasingly requiring their suppliers to meet specific animal welfare standards. Moreover, major banking institutions, such as the International Finance Corporation (IFC; a subsidiary of the World Bank Group), the European Bank for Reconstruction and Development (EBRD) and the Rabobank Group, have developed or are developing lending criteria that include, as a precondition for a loan, that their agricultural clients meet animal welfare standards.

Finally, non-governmental organisations such as World Animal Protection (previously the World Society for the Protection of Animals), Compassion in World Farming (CIWF) and others are continuing to have positive influence via various initiatives and projects, including a proposal that the United Nations adopt a Universal Declaration on Animal Welfare, an Animal Protection Index project to rank the animal welfare policies of national governments using a set of core indicators, and a Business Benchmarking for Animal Welfare (BBAW) project.

This Strategy aims to provide a further boost to major changes that have occurred within modern zoos and aquariums during the last 20 years—changes that have been guided by publication of the *World Zoo Conservation Strategy* in 1993, the *World Zoo and Aquarium Conservation Strategy* in 2005, the *Global Aquarium Strategy for Conservation and Sustainability* in 2009 and the revised *World Zoo and Aquarium Conservation Strategy* in 2015. Note that the primary role of this Strategy is *guidance*. It highlights some zoo and aquarium activities that may have negative animal welfare impacts, how those impacts may be minimised, and draws attention to approaches that may contribute to the promotion of positive welfare states and their recognition. It does not consist of prescriptive animal welfare standards. Nor does it seek to impose animal welfare-related policy changes on zoos and aquariums, although some suggestions are made regarding areas where apposite policy development might be considered. This is in line with the *WAZA Code of Ethics and Animal Welfare*, adopted in 2003 (see *appendix*).

Internationally, taking practical steps to improve animal welfare in the zoos and aquariums of a country may be conceived of in terms of a ‘journey’ where the participants have reached different stages. Some such institutions will be close to the beginning, some will be at intermediate stages and others will have travelled a substantial distance. Moreover, the complex dynamics of the major interacting factors that influence the journey in different countries will determine the precise route and speed of the journey in each case. These factors may include socio-cultural imperatives, religious precepts, ethical issues, economic constraints, the extent and nature of political engagement, historical and current views on the place of animals in society, and what animal welfare is understood to mean. Nevertheless, the wide range of journey progression apparent within WAZA member organisations provides considerable opportunities for constructive interaction between those whose journeys are well advanced and those where there is some distance yet to be travelled. Use of this Strategy is anticipated to facilitate such constructive engagement between members.

More specifically, this Strategy provides guidance to zoos and aquariums to achieve high standards of animal welfare in support of their conservation, educational, research and recreational goals. It provides a brief account of current scientific understanding of animal welfare and its assessment (*Chapter 1*). It recognises that achieving high welfare standards must be supported by science-based moni-

toring directed at achieving good animal care, and briefly describes objective means of doing so (*Chapter 2*). Such monitoring and care need to focus both on minimising negative welfare states and, where possible and appropriate, on promoting positive welfare states. Environmental enrichment initiatives taken by staff to provide animals with opportunities for challenge and choice (*Chapter 3*), aligned with exhibit design that enhances animals' comfort, pleasure, interest and confidence (*Chapter 4*), are important elements in promoting positive welfare states.

The Strategy acknowledges that some activities such as breeding, translocations, return to the wild and the like, which are designed to support sustainable species populations within zoos and aquariums and in the wild, may at times give rise to animal welfare compromise (*Chapter 5*). However, it notes that when such activities are undertaken, approaches should be adopted where the minimisation of negative welfare consequences is integrated with the aim of sustainable species management (*Chapter 6*). Thus, the overall objective is, where possible, to harmonise wildlife conservation and animal welfare goals and activities.

The Strategy emphasises the importance of adopting a scientific, evidence-based approach both to animal welfare management and to the conduct of zoo and aquarium research (*Chapter 7*). Moreover, it emphasises the value of working collaboratively and openly with external colleagues and other interested parties who are willing to constructively participate in discussions and activities (*Chapter 8*). The general purpose is to widen the discipline, experiential and skill bases brought to bear on all key elements of animal welfare management that are designed to improve the lives of zoo and aquarium animals. Finally, while recognising the need for visitor engagement, the importance of protecting and enhancing the welfare of the animals in all their interactions with visitors is highlighted (*Chapter 9*).



HOUSTON ZOO, TX, USA

An endangered Attwater's prairie chicken hatched at Houston Zoo and cared for before release into the wild.

Each chapter is structured so that recommendations that mainly focus on possible policy developments are suggested at the beginning. The material content of the chapter is then presented, and the chapter ends with a checklist that mainly translates the content of the chapter into possible specific actions.

In the development of this Strategy, we wish to sincerely thank the contributing authors and their institutions (*see page 4*) as well as the following additional contributors: Georgina Allen, Andrew Baker, Tiffany Blackett, Miriam Brandt, Lee Ehmke, Frank Göritz, Brij Gupta, Becca Hanson, Robert Hermes, Thomas Hildebrandt, Warner Jens, David Jones, Pia Krawinkel, Jörg Luy, Lance Miller, Leo Oosterweghel and Greg Vicino. David Fraser kindly wrote the Foreword, Júlia Hanuliaková provided the wellness pyramid drawing, Georgina Allen assisted with editing and Megan Farias, together with Martha Parker and Peter Riger, designed the Strategy. We are indebted to those who commented on earlier drafts of the Strategy: Heather Bacon, Claire Bass, Sally Binding, Wen-Haur Cheng, Ros Clubb, Peter Clark, Neil D'Cruze, Danny de Man, Gerald Dick, Peter Dollinger, Dag Encke, Karen Fifield, Jenny Gray, Myfanwy Griffith, Robert Hubrecht, Jörg Junhold, Ron Kagan, Thomas Kauffels, Theo Pagel, Thomas Pietsch, Peter Pueschel, Alex Rübel, Simon Tonge, William van Lint, Kris Vehrs, Gisela von Hegel, Sally Walker and John Werth. Houston Zoo generously supported the production of this Strategy.

We are grateful for the input provided by members of WAZA Council and participants to two Strategy workshops in 2013 and 2015, with representatives from the world zoo and aquarium community and academic institutions. We particularly wish to thank representatives of the following international animal welfare non-governmental organisations who greatly assisted us in the development of this Strategy: FOUR PAWS, Humane Society International (HSI), International Fund for Animal Welfare (IFAW), Royal Society for the Prevention of Cruelty to Animals (RSPCA), Universities Federation for Animal Welfare (UFAW), Wild Welfare and World Animal Protection. Sadly, Peter Pueschel (Director, International Environmental Agreements, IFAW) passed away during the development of this Strategy. His memory will live on within these pages.

David J. Mellor

Susan Hunt

Markus Gusset

This Strategy is a guide to zoos and aquariums to achieve high standards of animal welfare in support of their goals as modern conservation organisations.

BACKGROUND

In an increasingly urbanised world, zoos and aquariums aim to connect people to nature. As a key interface between humans and the natural world, zoos and aquariums enable people to experience wildlife in safe and engaging environments. They also contribute to conserving the world's biodiversity, and at the same time seek to increase understanding and appreciation of wildlife. In addition, through improving environmental education, community awareness, advocacy and other activities, zoos and aquariums aim to encourage conservation of wildlife and natural environments.

Leading zoos and aquariums situate animal welfare as primary to their operations. While conservation of wildlife is the core purpose of leading zoos and aquariums, seeking to achieve positive animal welfare states is a core activity.

Zoos and aquariums maintain high animal welfare standards using scientific knowledge and practical experience to guide the management of all species they hold. Moreover, they provide opportunities to combine wildlife science and animal welfare science to enhance the species-specific knowledge required to secure the survival and manage the welfare of the wildlife and other animals in their care.



PANTANAL, BRAZIL
Caiman

Many of societies' expectations regarding what are acceptable and unacceptable ways of treating animals, principally mammals and birds, have changed as understanding of their physical and behavioural needs has grown. Today, there is significant interest in how good animal welfare standards can be maintained when conservation-related practices are applied to wildlife. Conservation and welfare management have become closely linked, providing opportunities to develop pragmatic solutions to furthering the purposes of animal welfare and species conservation whilst at the same time managing their sometimes conflicting requirements.

WHAT IS THE PURPOSE OF THIS STRATEGY?

Modern zoos and aquariums primarily exist for the purposes of wildlife conservation, using field engagement, environmental education, public awareness, advocacy, breeding programmes, fundraising, research collaborations and partnerships to achieve their goals. A modern zoo or aquarium uses the most up-to-date information, evidence and knowledge to achieve its conservation mission and has an ongoing commitment to continued progression in best-practice holistic animal care.

The *World Zoo and Aquarium Animal Welfare Strategy* provides guidance on how to establish and maintain acceptable animal welfare standards and related best practice within this framework. It also provides information to assist zoos and aquariums to demonstrate an understanding of animal welfare and put this into action.

The diverse nature of animal collections in zoos and aquariums presents greater management challenges than are usually encountered by organisations that have a much narrower species focus, such as those in the farming sector. The breadth of knowledge required is correspondingly much wider. So are the demands of keeping up-to-date with new scientifically validated management practices aimed at supporting continual improvement in animal care. This requires a high level of organisational policy commitment and knowledgeable staff with appropriate practical expertise. These are essential components to achieving good animal welfare.

ANIMAL ETHICS AND ANIMAL WELFARE

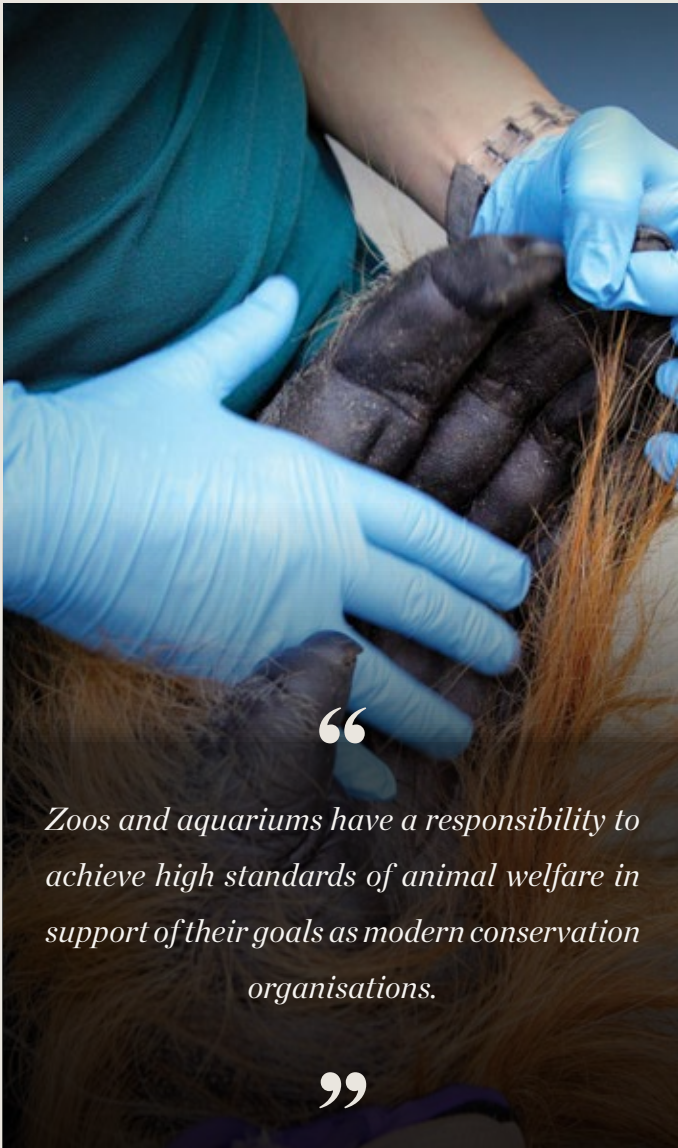
It is helpful to distinguish between animal ethics and animal welfare. Ethics addresses questions relating to how groups of people decide to regulate their behaviour, such as the decisions they make about what is legitimate and acceptable

in pursuit of their aims, and what is not, and the grounds for those decisions. Thus, animal ethics may be seen to identify a values-based impetus for all animal-holding organisations, including zoos and aquariums, to aim for high animal welfare standards in their activities. There are several ethical theories that are relevant to this, but a discussion of them is beyond the scope of this Strategy. Note, however, that in this context, a primary commitment to achieving the highest possible standards of animal welfare in the practical circumstances of each zoo and aquarium, and an equal commitment for these organisations to improve such circumstances where that is possible and necessary, are ethically driven.

There are two major features of animal welfare that are relevant to zoos and aquariums. The first is meeting animals' basic survival needs for food, shelter, health and safety. The second is to enhance their welfare above this survival minimum by increasing opportunities for animals to have positive experiences, focused, for example, on their comfort, pleasure, interest and confidence. Although the objective

would be to achieve both, there are circumstances where that is not easy to apply. For example, a pressing conservation need to secure the survival of some threatened species may sometimes override this dual objective. It should be recognised that whilst suboptimal environments may achieve short-term success, they may be less likely to support long-term conservation outcomes. Managers and animal care staff must demonstrably attempt to provide positive experiences for animals, regardless of resource or facility limitations and conservation needs.

These and other matters are addressed in this Strategy. The first chapter provides a brief account of our current science-based understanding of animal welfare and its assessment. The subsequent chapters outline the welfare implications of monitoring and managing of animal welfare; environmental enrichment; exhibit design; breeding programmes and collection planning; conservation welfare; animal welfare research; partnerships in animal welfare; and engagement and interaction with visitors.



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Zoos and aquariums have a responsibility to achieve high standards of animal welfare in support of their goals as modern conservation organisations.

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WAZA ANIMAL WELFARE COMMITMENT STATEMENT

World-leading zoos and aquariums that are members of WAZA should have a continuing commitment to animal welfare. The following statement outlines the basis of WAZA members' commitment:

OUR COMMITMENT IS TO:

- strive to achieve high welfare standards for the animals in our care;
- be animal welfare leaders, advocates and authoritative advisers; and
- provide environments that focus on the animals' physical and behavioural needs.

IN DOING THIS, WE COMMIT TO:

- treat all animals in our zoos and aquariums with respect;
- make high animal welfare standards a major focus of our husbandry activities;
- ensure that all husbandry decisions are underpinned by up-to-date animal welfare science and veterinary science;
- build and share with colleagues animal care and welfare knowledge, skills and best practice advice;
- comply with specific animal welfare standards set out by regional zoo and aquarium associations and WAZA; and
- comply with jurisdictional and national codes of practice, regulations and legislation as well as international treaties relating to animal care and welfare.



SPOTTED HYAENAS
LEIPZIG ZOO, GERMANY



CARE

*Our commitment is to develop excellence
in zoo and aquarium animal welfare.*

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Develop an animal welfare charter for your organisation that reflects a clear commitment to animal welfare principles.
2. Cater to the physical and behavioural needs of animals when providing for their care. This includes creating opportunities for them to benefit from rewarding challenges and choices whenever that is practically feasible.
3. Seek to continuously improve animal welfare understanding to better promote positive welfare states in all species held by your organisation.
4. Implement science-based animal welfare monitoring processes that use indices aligned with the animals' physical/functional states and behavioural activities.
5. Use the 'Five Domains' model to understand and assess different animal welfare states.
6. Promote knowledge and understanding of animal welfare and its management within the wider community.

INTRODUCTION

What is animal welfare? How do ideas about animal welfare apply to zoos and aquariums? Although there are several different ways of thinking about animal welfare, the science underpinning it continues to advance, where the principal focus has been on mammals and birds. The following description of animal welfare provides helpful insights (World Organisation for Animal Health – OIE):

Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear and distress. Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter/killing. Animal welfare refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry and humane treatment.

Animal welfare refers to the state of an animal, including the subjective feelings and sensations it experiences as a result of its physical health and surrounding influences. For example, an animal may experience negative states such as the feeling of hunger if there is insufficient food, pain if it is injured and fear if it is threatened. An animal

would typically seek to reduce or avoid these and other such negative experiences, especially when they are intense, and would be considered to be in a negative (or poor) state of welfare if unable to do so.

Advances in animal welfare science have highlighted the importance of considering animals' psychological states when assessing welfare over time. Therefore, it is not just the physical/functional needs of animals that require attention in caring for animals in zoos and aquariums, but the integration of these with their potential to have a wide range of experiences. Thus, animal welfare science has not only confirmed that animals may have negative experiences, but has also demonstrated the existence of positive experiences. Animal welfare is therefore understood to vary on a continuum from very poor to very good.

The promotion of positive animal welfare states requires different approaches to minimising negative animal welfare states. Modern zoos and aquariums should work to minimise the occurrence of negative states in their animals and, concurrently, should make efforts to promote positive states.

So what are positive animal welfare states? Animals experience a generally positive state of welfare when their physical and behavioural needs are met and when the environment provides them with rewarding challenges and choices over time. Throughout this Strategy, zoos and aquariums are urged to aim for high animal welfare standards using approaches designed to enable animals to have positive experiences. This involves understanding science-based principles, encouraging research and recognising the importance of staff expertise, monitoring skills and veterinary care.

Thousands of different species are held in zoos and aquariums worldwide, so managing their welfare is complex in terms of the diverse knowledge required. Up to now, the welfare of mega-fauna has received special attention. In some cases, such as elephants and some primate species, the welfare-related care standards are most understood. However, much still remains to be done, especially with less well-studied mammals and birds, and other sentient vertebrates. A major challenge is to continually expand the knowledge and expertise required to manage species, and to better understand how the zoo or aquarium environment and husbandry has an impact on animal welfare, so that eventually, positive welfare states may be promoted in all of them. A number of zoos and aquariums have established facilities dedicated to furthering our understanding of animal welfare (*see case study 1.1*).

SURVIVAL, CHALLENGES AND CHOICES

In order for an animal to have positive experiences, many of its basic physical/functional needs must be met first. An animal's basic needs play an important role in its survival; for example, its requirements for oxygen, water, food and thermal equilibrium, and the avoidance of significant injury and disease. Only when these and other such survival needs are met will minimisation of associated negative experiences (e.g. breathlessness, thirst, hunger, thermal discomfort and pain) be sufficient to enable the animal to have positive experiences. Addressing only the negative survival-related experiences will not necessarily give rise to positive experiences, but may merely change the welfare state from being negative to neutral.

An animal's experiences are also influenced by its perception of its external circumstances and the extent of its motivation to engage in diverse behaviours that it would find rewarding; that is, its lived experiences related to its behavioural opportunities. Therefore, zoo and aquarium management should meet the animals' basic survival needs in species-appropriate ways that minimise negative welfare states, and should also establish environments and associated care regimes that promote positive welfare states.

Many zoos and aquariums already aim to provide engaging challenges and choices for animals, and seek to develop innovative ways to broaden the range of positive experiences available to the animals. Choices may include where and what to eat, to interact or not with other animals, or to seek different environments that provide variable comforts. Challenges may be cognitive or physical, relating to opportunities to seek out desired food and other rewards. Challenges should be both species-specific and designed with the needs and ability of the individual animal in mind and continue to be progressively challenging and varied.

It is important for each organisation to have sufficient staff members with the required knowledge and skills to ensure that animal welfare is addressed. This involves the ongoing assessment and management of the animals' welfare and living circumstances, including their physical health and responses to the environment. Staff must stay up to date and share skills through, for example, developing capacity, attending relevant workshops or symposia.

It is acknowledged that the knowledge base across all zoo and aquarium species is still developing. Zoos and aquariums should continue to use known indicators to assess animal welfare at the species-specific level and also source and lead sound research to build understanding to further improve animal welfare monitoring and outcomes for a wider range of species.

So how can we assess animal welfare? How do we assess an animal's negative and positive subjective experiences? Presented here is the 'Five Domains' model, which is a useful framework for undertaking systematic and structured assessments of animal welfare in these terms.

It is acknowledged that animals' subjective experiences cannot be measured directly. However, cautiously evaluating what they might be in species where there is sufficient knowledge to do so supports the application of species-specific husbandry routines, veterinary procedures and environmental enrichment activities that address animal welfare.



Case study 1.1:

Animal welfare research in zoological organisations

There are many zoos and aquariums conducting or contributing to research on animal welfare. For example, a consortium of US zoos undertook a multi-institutional study examining the welfare of elephants (*Elephas maximus* and *Loxodonta africana*). Although this was a very large study, many zoos and aquariums have conducted smaller studies on numerous other species (e.g. the welfare of great apes). As scrutiny of animal welfare continues to rise, continuing to build relevant expertise will be important; for example, by researching innovative ways to monitor animal welfare states. The Chicago Zoological Society created the Center for the Science of Animal Welfare, the Detroit Zoological Society established the Center for Zoo Animal Welfare and the San Francisco Zoological Society founded the Wellness and Conservation Center. It is anticipated that internationally, as zoos and aquariums move into the future, more and more of them will develop facilities with a focus on welfare and the aim of helping to ensure that the animals held can thrive.

HOUSTON ZOO, TX, USA
Asian elephants

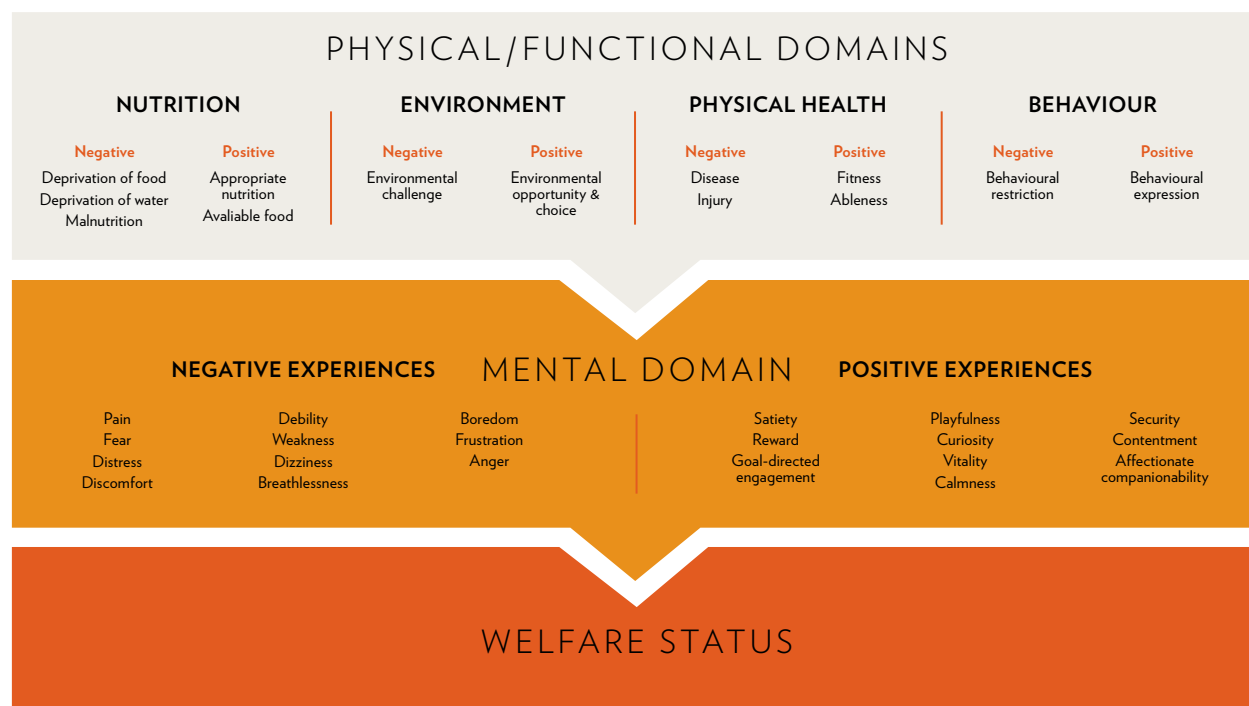
A USEFUL FRAMEWORK: THE 'FIVE DOMAINS' MODEL

The Five Domains model is not intended to be an accurate physical and functional representation of the body, but is designed to facilitate animal welfare understanding and assessment. This model outlines four physical/functional domains of 'nutrition', 'environment', 'physical health' and 'behaviour', and the fifth domain, which is the animal's 'mental' state (*Fig. 1.1*).

As welfare is a state within an animal and is understood in terms of what the animal experiences subjectively, this model identifies the two main sources of those mental experiences. The first is the feelings and sensations (collectively known as 'affects') that motivate animals to undertake behaviours considered to be essential for their survival. These include thirst motivating an animal to drink, hunger motivating it to eat and pain indicating things to avoid. These and other survival-related factors are typically covered within the domains of 'nutrition', 'environment' and 'physical health'.

FIVE DOMAINS MODEL

Fig. 1.1. The Five Domains model for understanding animal welfare, divided into physical/functional and mental components, provides examples of how internal and external conditions give rise to negative (aversive) and positive (pleasant) subjective experiences, the integrated effects of which give rise to an animal's welfare status (modified from Mellor & Beausoleil 2015).



The fourth domain of 'behaviour' captures the second source of subjective experiences, which can be negative or positive, and relates to animals' perception of their external circumstances. Negative examples include: threat eliciting fear, isolation leading to loneliness and low stimulation to boredom; and positive examples include: security engendering confidence and pleasure giving rise to a sense of reward.

Reference to the first four domains enables systematic consideration of a wide range of conditions that may give rise to a range of subjective experiences found within the fifth 'mental' domain. The net impact of all of these experiences is assessed as representing the animal's welfare status.

It is the nature of factors aligned with the physical/functional domains to change over time, as do the animal's related perceptions and experiences, which are assigned for consideration to the mental domain of the model. Thus, an animal's welfare state at any one time is located on a continuum between the extremes of very poor and very good, and at different times its welfare may decline or improve. The purposes of animal welfare assessment and management are to monitor, detect and correct poor welfare when it occurs, and to maintain good welfare and preferably very good welfare when that is practically feasible.

Opportunities for promoting positive animal welfare states aligned with the Five Domains model can include the following:

- Nutrition: the appropriate consumption of nutritious foods is an ongoing pleasurable experience.
- Environment: benign conditions offer ongoing comfort and safety.
- Physical health: ongoing good physical health secures robustness and vitality.
- Behaviour: activities involving variety, choice and benign challenge are rewarding.
- Mental or affective state: survival-related negative experiences are minimal, and comfort, pleasure, interest and confidence are common positive experiences.

As the key elements of this approach are based on biological understanding of well-studied mammals and birds, its wider application to other such species can occur, provided that unique features of their biology are taken into consideration. On the other hand, application of the model to other species in zoos and aquariums will require input from experts in their specific biology. Nevertheless, use of the model helpfully raises questions about how the basic survival needs of each species are met, whether or not they might have the capacity for pleasurable experiences and, if so, how those experiences might be expressed and under what circumstances.

ASSESSING ANIMAL WELFARE

A key part of protocols and practices designed to ensure that animal welfare remains at acceptably high levels is the need for ongoing assessment of an animal's welfare. It is apparent that both negative and positive experiences are of welfare significance and an animal's welfare state reflects the balance between them. In general, welfare will be negative when negative experiences predominate, *neutral* when the negative and positive experiences are in balance overall, and *positive* when positive experiences predominate.

It is also apparent that negative experiences are of two major types. The first includes those that *motivate survival-critical behaviours*. For example, breathlessness motivating breathing, thirst drinking, hunger eating and pain the avoidance of or withdrawal from injurious stimuli. The second type, designated *situation-related negative experiences*, includes those reflecting animals' adverse responses to their environment. For example, in mammals, barren surroundings leading to boredom, individual isolation to loneliness and threat to fear.

Regarding the first type, good animal husbandry and veterinary practices can at best only temporarily neutralise the negative survival-critical experiences. They cannot be eliminated completely. Biologically they are essential to motivate animals to behave in ways that enable them to acquire, for example, life-sustaining oxygen, water and food, and to avoid or minimise injury.

Regarding situation-related negative experiences, these can be replaced, or avoided, by providing animals with opportunities to engage in behaviours they are likely to find rewarding. This is principally by environmental enrichment activities that generate positive experiences. Such experiences may include satiety, goal-directed engagement, interest, curiosity, satisfaction, bonded companionship, playfulness, comfort and confidence.

Knowledge and expertise is critical to the promotion of positive welfare states. Understanding species-specific needs can greatly reduce negative experiences by applying the relevant knowledge and skills to promoting positive states. For example, negative experiences of social animals are often related to unsuitable social structures of a group and can be remedied.

The objective in caring for zoo and aquarium animals is to avoid extremes of the survival-critical negative experiences and with regard to situation-related experiences, to provide opportunities for animals to engage in behaviours they appear to find pleasurable or rewarding.

PHYSICAL AND CLINICAL INDICES OF ANIMAL WELFARE

Numerous indices (measurable variables) are available and provide checklists for monitoring welfare states. They show the presence or absence of the physical/functional states and behaviours that underlie the welfare state of an animal. These indices therefore allow negative, neutral and positive welfare states to be detected and changes in them to be monitored and managed. Their use in this way is based on many years of validating scientific and veterinary clinical research. The physical/functional indices are either *externally observable* or *internally measurable* and usually align with the nutrition, environment and health domains of the Five Domains model (Fig. 1.1).

Examples of *externally observable* indices include the appropriateness of growth rates and developmental milestones in young animals, age at maturity, lack of reproductive success in adults and the general appearance of the animals with regard to their health and their longevity in human care. Some are outlined below:

- Nutrition: weight change and/or body condition score, appropriateness of water or food intake, and/or the presence of aggression at feeding time that indicates hunger.
- Environment: injuries due to physical restrictions of close confinement, behavioural evidence of negative impacts of temperature extremes, and/or signs of irritation by polluting gases.
- Health: the presence of injuries such as cuts, bruises, abrasions and changes in behaviour such as demeanour, appearance, vocalisation and impaired movement; also presence of infections, fever and increased heart rate.

These externally observable indices, which can be seen easily during informed observational assessment by staff, are often the first sign of welfare problems. They also provide guidance on the likely cause and often point to the required remedial actions that would commonly involve husbandry or veterinary therapeutic interventions.

Internally measurable indices relate to physiological, pathological or clinical conditions. These indices would not usually be employed for day-to-day welfare monitoring unless related to a specific disease investigation or an otherwise intractable welfare problem. Examples include: measurement of specific blood parameters for hydration status, nutritional status, immunological competence, stress hormone release and release of other hormones; measurement of hormone levels in saliva, urine and faeces; also there are numerous established indices of the functionality of the heart, lungs, blood vessel, kidneys, digestive organs, muscles, skeleton, nervous system and sense organs.



PERTH ZOO, AUSTRALIA
A zoo staff member assesses the health of a red panda.

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Managing animal welfare in zoos and aquariums is a complex area where the science-based understanding and methods are developing rapidly.

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ANIMAL BEHAVIOURAL OBSERVATIONS

Behaviour is commonly considered to be a clear indicator of the welfare state and health of an animal, and has been used effectively for that purpose for many decades. Historically, many behaviour scientists were reluctant to link particular subjective experiences to particular behaviours, considering that to be unscientific.

However, animal welfare science is now providing increasingly strong support for three key propositions: first, that particular behaviours of mammals, birds and reptiles suggest what their goals might be; secondly, that such goal-directed behaviours themselves and the animals' behavioural responses when they do or do not achieve those goals may allow inferences to be made about the accompanying positive or negative experiences; and thirdly, that an animal's experience is

likely to be positive whilst it actively engages in behaviours that involve impulse processing in reward-associated neural circuits of the brain. Taken together, this provides a basis for cautiously interpreting animal behaviour in terms of what the accompanying subjective experiences may be.

The behaviour domain of the Five Domains model (*Fig. 1.1*) incorporates this and refers to animals' likely perceptions of their external circumstances and the resulting associated negative or positive experiences. For example, there is strong behavioural evidence that social mammals kept closely confined in barren exhibits with no company and provided with food that takes little time to consume are likely to have negative experiences, such as anxiety, fear, frustration, loneliness, boredom and depression. At the other extreme, behavioural evidence suggests that such group-living species kept in extensive stimulus-rich environments with opportunities to, for example, explore, forage or hunt, bond and reaffirm bonds, care for young, play and be sexually active are more likely to have positive experiences, such as feeling energised, engaged, affectionately sociable and parentally rewarded.

Consideration of the wide range of experiential consequences of situation-related factors such as these highlights the need to evaluate the potential benefits of introducing, maintaining or extending environmental enrichment activities. These observations strongly support the well-demonstrated commitment to environmental enrichment within the zoo and aquarium sector (*see Chapter 3*), and indicate that behavioural assessment can beneficially provide information about the efficacy of environmental enrichment.



PERTH ZOO, AUSTRALIA
Orangutans

As noted above, these observations refer mainly to mammals and birds, and therefore may not be directly applicable to other vertebrate species. However, zoo and aquarium staff are well positioned to develop enrichments that are appropriate for the variety of species in their care and considerate care and research should be applied to all species held within these institutions.

CONCLUSION

The Five Domains provide a useful and practical model for zoos and aquariums. By applying knowledge of negative, neutral and positive welfare states, animal welfare assessment is possible and achievable. It is a framework that enables animal carers to recognise and meet animals' survival needs and helps to provide opportunities for animals to experience positive welfare states. This is the basis for creating pleasurable challenge and choice for zoo and aquarium animals.

Managing animal welfare in zoos and aquariums is a complex area where the science-based understanding and methods are developing rapidly. An area of particular challenge is the wide range of species held by zoos and aquariums. There is a consequent need to continue to acquire species-specific knowledge about less well-studied species to enable their welfare to be understood and managed appropriately. Ongoing input from experts and zoo- and aquarium-based biological research will be required.

Animal welfare assessment is a critical component of modern animal care in zoos and aquariums. Assessment approaches have several facets and employ indices based on physical/functional conditions and behaviours that align with the negative and/or positive experiences animals may have.



Boa constrictor

CHECKLIST

- Are you up to date with the scientific advances in understanding and assessing animal welfare?
- Do you have a stated policy commitment to manage animal welfare appropriately (such as the WAZA commitment statement)?
- Do your staff members understand your organisation's commitment to animal welfare and how to implement this commitment?
- Are your staff members trained to monitor and manage the welfare of animals in their care?
- Have you communicated your animal welfare commitment to your stakeholders, such as visitors, regulatory authority and others?
- Does your approach to animal welfare seek to ensure that negative welfare states are minimised?
- Does your approach to animal welfare seek to promote positive welfare states?

NOTES:



POLAR BEAR
SVALBARD ISLANDS, NORWAY



COMMIT

*Our commitment is to monitor the welfare state of animals
to achieve high standards of care.*

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Make animal welfare-based accreditation a priority. This may be through your regional zoo and aquarium association or by adopting welfare standards and monitoring used by other regions or countries.
2. Make sure that animal care staff have relevant scientific training and expertise, keep abreast of latest developments in animal health and welfare monitoring methods, and link with other professional bodies and organisations to share knowledge and best practice.
3. Develop and maintain a staff culture that practices regular reporting and monitoring of animals' behaviour and health. Maintain and keep updated all associated animal records.
4. Using up-to-date animal welfare research, collaborate with other institutions to establish 'baseline' animal welfare data for individual animals and groups to enable comparison with any new data.
5. Scrutinise how animals are transported and address any potential animal welfare risks. Develop plans for moving animals that also abide by any relevant national and international standards. Require that animal welfare standards and practices of receiving institutions are checked and seen to be at or above those outlined in this Strategy and regional zoo and aquarium associations' welfare policies.
6. Employ veterinarians, biologists, welfare scientists and behavioural experts with experience in a broad range of taxa to ensure high standards of animal welfare and health care, including preventative health care interventions.
7. With regard to whole-of-life care, develop comprehensive animal health plans and, if needed, specialist policies that include catering to the special needs of very young, ill, injured and geriatric animals.
8. Put plans in place to prevent and address animal disease outbreaks, including disease transmission between animals and people, and ensure that quarantine protocols are available when required.

INTRODUCTION

Monitoring animal welfare is clearly critical to effective animal management in zoos and aquariums. The physical/functional indices and behavioural indices referred to in *Chapter 1* may be used to detect poor animal welfare and

identify features of positive experiences. They also enable the detection of improvements in poor welfare by applying remedial husbandry and veterinary therapeutic interventions, and/or by providing animals with welfare-enhancing behavioural opportunities. Managing the high numbers of species in zoos and aquariums also requires high levels of staff expertise and sound planning and policies.

SPECIES- AND ANIMAL-SPECIFIC KNOWLEDGE

As outlined in *Chapter 1*, the number of species held by zoos and aquariums creates significant challenges in animal welfare monitoring. Developing strong staff expertise and working with others to develop species-specific knowledge are vital to enhance animal welfare monitoring. Additionally, specific staff knowledge and development of staff expertise to better understand behavioural traits and changes in individual animals must be an ongoing priority.

Progress is being made to address these challenges through regional zoo and aquarium associations' accreditation programmes. For example, commencing in 2014, the Zoo and Aquarium Association (ZAA) Australasia's programme assessed welfare compromise and welfare enhancement in member zoos and aquariums across a range of species. This approach can lead staff to improve current management of the physical/functional aspects of welfare and to identify novel ways of enhancing welfare by the provision of previously unrecognised opportunities for animals to engage in behaviours they are likely to find rewarding. Wherever possible, zoos and aquariums should seek accreditation through regional zoo and aquarium associations, as many of these associations are leading in assessment and management of appropriate species-specific care of wildlife.

Keeping records that detail the physical, functional and behavioural observations are important for effective animal welfare management. Records enable the ongoing condition of animals, including any changes, deterioration, stability or improvement in welfare states, to be noted. They also enable any unintended management changes that may be identified as responsible for a problem and the outcomes of any purposeful husbandry or veterinary interventions to be noted. Such information not only provides a basis for review of the impact of current practice (*see case study 2.1*), but can also guide the introduction of novel approaches intended to enhance welfare (*see case study 2.2*).

CARING FOR WILDLIFE



Case study 2.1:

Systematic behavioural monitoring is a tool that can be used to optimise animal welfare.

The team at Disney's Animal Kingdom had a long-term behavioural monitoring programme in place to assist in their management of six female tigers (*Panthera tigris*). These tigers were socially housed, which was a unique management situation in zoos. The monitoring programme allowed the team to track changes in the social relationships of these animals over time. These observations informed selection of the various social groupings to maximise compatibility, while maintaining variability in social partners. The study also allowed for the staff to determine the impacts of different management practices, exhibitry techniques and impact of exhibit construction on the behaviour of individual animals. The behavioural monitoring programme thus informed animal care decisions with optimal welfare outcomes, while also providing important baseline information to others zoos considering social housing of tigers.

DISNEY'S ANIMAL KINGDOM, FL, USA
Tigers



Case study 2.2:

The value of regularly collecting animal welfare data.

In many zoos and aquariums, staff members assess daily activity patterns of animals, but the value of doing this may be reduced when only limited time is spent with animals in a very specific context. For most zoo and aquarium animals, the appearance of staff members can indicate an opportunity to receive food. Because of this connection, it is logical to assume that the absence of the staff members indicates no such opportunity. As such, food-related behaviour (e.g. exploration or foraging) seldom occurs when staff members are not present. Daily monitoring of an older brown bear (*Ursus arctos*) at San Diego Zoo indicated low levels of foraging behaviours until the introduction of an automatic feeder that was set to distribute random amounts of dry food at random intervals. After its installation, the brown bear's foraging behaviours increased five-fold and inactivity and stereotypic pacing decreased. The detailed monitoring allowed staff members to see the complexity of foraging behaviours and motivated a husbandry change, coupled with a philosophical change in the approach to providing food.

SAN DIEGO ZOO, CA, USA
Brown bear

WHOLE-OF-LIFE CARE OF ANIMALS

Many animals in zoos and aquariums spend their whole lives in a managed environment and may be present as a newborn, young, adolescent, mature and aging individual. Clearly, welfare-focused monitoring and management procedures need to be tailored to manage the changes required to care for the relative levels of robustness or vulnerability of animals during the different stages of their lives. Although the quality of care provided should be similar throughout the animals' lives, the *character* of care will be adjusted (see case study 2.3). This approach requires specialist knowledge and skills, which if not available within an institution, should be sought through working with others.



Case study 2.3:

Decision to hand-raise a young animal

A Javan gibbon (*Hylobates moloch*) born at Perth Zoo was dropped by its mother and was struggling to survive. The Zoo's animal specialists made the considered decision to hand-raise the animal. The intention was to reintroduce it to its family group as a priority, using proven methods applied to another gibbon species. Gibbons are highly social species and it is Perth Zoo's policy that due to animal welfare and long-term behavioural needs, gibbons should only be kept in family groups. The decision to hand-raise this animal was made under the framework of a clear policy and up-to-date knowledge on the management and welfare of social species such as gibbons. In addition, there was oversight by an animal ethics committee with external membership and Zoo staff members. Perth Zoo has a strong history in gibbon management and of integrating hand-reared offspring back into gibbon families. It has successfully reintegrated white-cheeked gibbons (*Nomascus leucogenys*) back into family groups and they have subsequently successfully bred whilst living in a social group as part of the Australasian regional breeding programme.

Lifespan can vary between species from short to very long. The lives of long-lived animals can extend many years beyond their capacity to reproduce. Organisational planning for the long term must ensure that welfare is monitored and managed appropriately throughout the lives of all animals, and should include specific strategies for the care of geriatric animals. Making the environment more comfortable, dietary adjustments and testing for age-related diseases or other infirmities are some examples. Decision trees that take into account these factors and others, such as the natural longevity for the species and the level and frequency of veterinary intervention, can also be necessary. An aged animal's welfare state, if compromised, should be regularly assessed to determine if euthanasia would be preferable to ongoing veterinary care.

When animals are moved, zoos and aquariums should develop plans supported by professional staff so that animal acquisitions, movements and transactions do not result in poor animal welfare outcomes. Regional zoo and aquarium associations may have guidelines that can be applied to individual transactions.

VETERINARY CARE

Professional veterinary input is an essential part of providing appropriate health care and monitoring of the ongoing condition of zoo and aquarium animals. Registered veterinarians should always be a part of an animal management team, either through direct employment or by contracting private or consultant veterinarians. The number of veterinarians required will depend on the size and complexity of the zoo or aquarium.

Direct employment of veterinarians in zoos and aquariums provides a greater insight into the daily functioning of the organisation and provides more opportunities to holistically manage the diversity of the species held. Veterinarians specifically skilled in exotic animal and species-specific medicine should be sought locally and also from specialist veterinarians within the worldwide zoo and aquarium veterinarian community.

The implementation of some veterinary treatments may temporarily compromise animal welfare. Examples include pre- and post-treatment handling, surgical procedures and quarantines. Clearly, a major objective is to minimise any compromise and to expeditiously restore the animals' capacity to experience positive welfare states. All facilities in which animals undergo procedures, treatment or observations should be purpose-designed or retrofitted to facilitate veterinary interventions and the realisation of welfare aims (see Chapter 4). Also, facilities design should address staff safety when handling potentially dangerous animals.

Most zoo and aquarium animals are non-domesticated wildlife species and usually resist restraint and treatment. Positive reinforcement training has become a popular and necessary practice that is used well by zoos and aquariums to reduce stress on animals and which can minimise the requirement to use anaesthetics or sedatives. Training an animal correctly can reinforce a positive relationship between the trainer and animal, and encourage positive welfare for future interactions. All training should create an environment that is interesting and stimulating for the animals and allow animal choices to participate.

PERTH ZOO, AUSTRALIA
Javan gibbon



USHAKA SEA WORLD DURBAN, SOUTH AFRICA
South African fur seal

Case study 2.4:

Positive reinforcement training for veterinary procedures.

Gimli is a South African fur seal (*Arctocephalus pusillus*) born at uShaka Sea World Durban in 1986. The animal is blind and, although in retirement, still undergoes daily routine and new husbandry training. The animal presented with lethargic behaviour, swollen flippers and a racing heart rate. Many voluntary diagnostic procedures were performed on it, including x-ray, ultrasound and a needle biopsy. The animal cooperated exceptionally well. A mass near the bladder was found as well as some heart abnormalities. All seals at uShaka Sea World are trained to participate voluntarily in routine procedures, such as ear, eye and mouth examination, body condition scoring, taking temperatures, tooth brushing, auscultation, weighing, blood sampling, ultrasound and x-ray. A strong history of positive reinforcement training and animal-trainer relationship was paramount in the care of this geriatric seal. The animal was trusting and patiently allowed these procedures, even though it was not food motivated. The alternative of manual or drug restraint would have been stressful and potentially detrimental to the animal's health.

Positive reinforcement training focuses on a type of learning in which the animal is rewarded for desirable behaviours, and hence reinforces them. Such training, where animals present voluntarily for various procedures, can therefore assist veterinarians to use procedures that are largely non-invasive in health monitoring. These include administering injections, drawing blood, providing foot care and many others (see case study 2.4). Training of animals in this area and to enter their transport containers should be the norm at modern zoos and aquariums. An aversive training technique that includes inflicting pain and stress should not be applied within training practices.

Meticulous preparation for any anaesthetic event is critical to minimise any associated welfare compromise and to ensure that the aim of the procedure is achieved. Thus, an anaesthetic procedure plan should be drawn up in advance for every such event and it should be discussed and understood by all of those involved. When necessary, colleagues and the literature should be consulted for guidance about the choice of anaesthetic and its use. A post-anaesthetic debriefing should also be held to identify improvements for future application.

Veterinary responsibility extends to the management of animals quarantined to maintain biosecurity. Significant animal welfare compromise may occur in quarantined animals should they be stressed due to transport, relocation into unfamiliar surroundings, separation from familiar conspecifics and/or isolation, and in some cases being subjected to veterinary procedures. It is important for animal care staff working in quarantine areas to have the knowledge and skills required to detect abnormal behaviours and signs of illness and stress. The welfare focus of quarantine design should minimise the risk of injury and allow inclusion of enrichments and places for retreat to reduce stress. Animals should not be quarantined for longer than the minimum period needed to meet biosecurity requirements.

Zoonosis, the transmission of diseases between species, is of significant concern in zoos and aquariums because of the close proximity of animals to each other and of animals to humans. Safeguarding animal populations against cross-infection within establishments is a primary responsibility of the veterinary staff, who also have a major role in minimising disease transmission from animals to people.

Post-mortem examination of animals that die should always be conducted to better understand animal health and welfare. When planning human–animal contact, detailed management protocols should be in place to prevent zoonosis. Moreover, the veterinarian should ensure that a comprehensive animal health programme is in place and that only healthy, behaviourally suited and uncompromised animals are considered for direct human contact.

COLLABORATION IMPROVES MONITORING METHODS

Improvements in animal welfare benefit all zoos and aquariums and are often grounded in scientific study. These two factors lend themselves to collaborative efforts of peers and the development of professional groups that focus on industry-level approaches to the support of animal welfare initiatives (*also see Chapter 8*).

In the USA, several zoos and aquariums have developed centres that serve to perform animal welfare research and disseminate findings (*see case study 1.1*). These organisations are additionally supported by the Association of Zoos and Aquariums (AZA) animal welfare committee that works to identify general needs and support progress across North American zoos and aquariums. The European Association of Zoos and Aquaria (EAZA) secured funding to employ an animal welfare training officer and has also developed an animal welfare working group, both of which are intended to support initiatives of all EAZA members aimed at reaching high standards of animal welfare.

Recent and future symposia held at the Chicago Zoological Society’s Center for the Science of Animal Welfare, Detroit Zoological Society’s Center for Zoo Animal Welfare and other zoological institutions support the development of collaborative partnerships and the dissemination of ideas and findings among colleagues internationally.

CONCLUSION

Animal welfare monitoring or assessment is a critical component of modern animal care in zoos and aquariums. Monitoring programmes can take several forms but should employ indices based on physical/functional conditions and behaviours that are aligned with negative and/or positive experiences animals may have.

Traditionally, preventing or minimising negative animal welfare states has been the predominant welfare focus of animal management, but the promotion of positive welfare states is now receiving increasing attention. Monitoring using welfare-focused indices and record keeping are important components of effective animal welfare management systems, which must also be able to deal effectively with animals during all the stages of life represented within the organisation. Additionally, the adoption of animal management methods such as positive reinforcement training and the ongoing delivery of veterinary expertise enable this to occur.

Zoo and aquarium staff members should keep abreast of developments in animal health and welfare monitoring. Numerous resources exist that facilitate collaboration in investigating new questions in animal welfare. Resources should be aimed at training all relevant staff members to assess and monitor animal welfare and to support monitoring programmes.

SHEDD AQUARIUM, IL, USA
An aquarium staff member provides care for a penguin chick.



CHECKLIST

- Are you up to date with the scientific advances in monitoring animal welfare?
- Are your staff members trained to monitor and manage the welfare of animals in their care?
- Do staff members report daily on the animals' condition—physiologically, behaviourally and in terms of health?
- Are records kept to support staff members' observations?
- Do you have agreed processes for monitoring the welfare of animals in your care? Do they incorporate protocols for providing whole-of-life care when that is required?
- Do you have sufficient general and specialist veterinary input into the health care of your animals?
- Are there research activities or opportunities that you could introduce to improve your capacity to monitor animal welfare?
- Do you have animal welfare accreditation from your regional zoo and aquarium association?
- Do you use your regional zoo and aquarium association's resources regarding animal welfare knowledge and assessment?
- Do you seek advice, formally or informally, from other external organisations regarding your approaches to monitoring animal welfare?
- Could you link with other zoos and aquariums to review operations in a specific area?
- Do you have dedicated external advice on animal welfare, such as via an animal ethics and welfare committee?
- Do you have established policies and clear procedures for managing the care of geriatric and debilitated animals and for managing complex events such as animal transport?

NOTES:



Chilean flamingo



KOMODO DRAGON
HOUSTON ZOO, TX, USA



ENRICH

Our commitment is to provide animals with opportunities for challenge and choice to promote positive welfare states.

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Build staff skills, internal culture and commitment to embed enrichment strategies and activities into the daily management of all animals in your care. Regularly review these strategies and activities and provide ongoing staff training in this area.
2. Introduce different enrichments that provide challenges, choices and comfort to animals to maximise their psychological health. Change them when appropriate and design them to stimulate a diversity of species-specific natural behaviours.
3. Use positive reinforcement as an enrichment and training tool.
4. Evaluate enrichment success and failures and share enrichment successes and failures with other zoos and aquariums to improve your own and other's enrichment knowledge and activities.
5. Incorporate environmental enrichment into exhibit design and upgrades.
6. Share enrichment stories with visitors to broaden understanding and education of animal biology and welfare.
7. Use specific, target-orientated enrichment designed to meet specific behavioural needs.

INTRODUCTION

Environmental enrichment, also known as behavioural enrichment, provides species-appropriate challenges, opportunities and stimulation. Environmental enrichment includes the regular provision of dynamic environments, cognitive challenges,

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Opportunities to apply enrichment to all species held by zoos and aquariums should be incorporated as knowledge grows.

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social opportunities, positive interactions with humans and other means of engaging individual animals. The practice of enrichment has now been integrated as a basic principle of zoo and aquarium animal husbandry, which, to date, has been applied mainly to mammals and birds. Opportunities to apply enrichment to all species held by zoos and aquariums should be incorporated as knowledge grows.

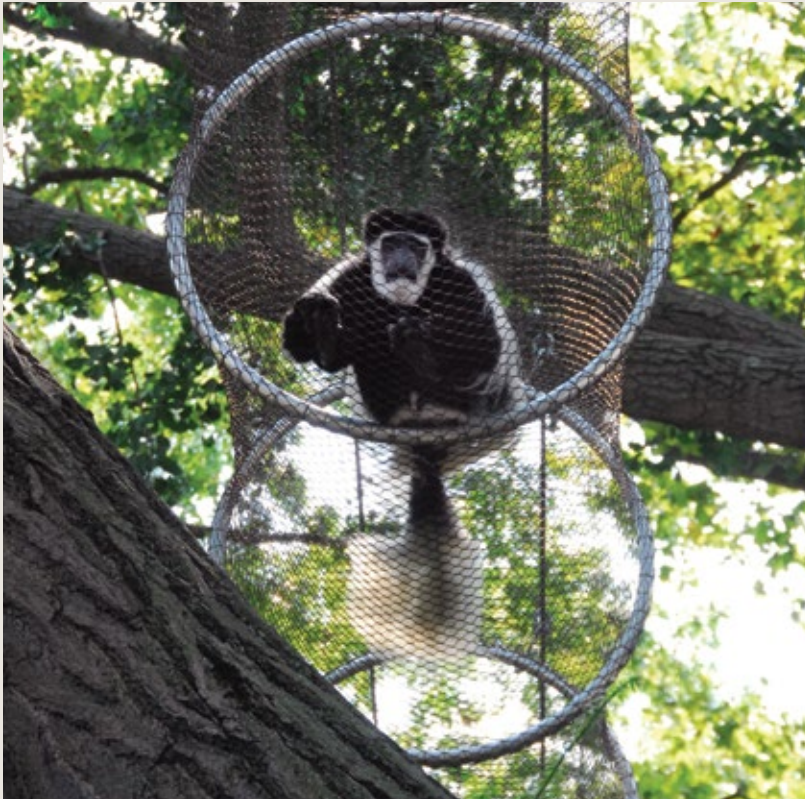
An enriched environment should promote a range of normal behaviours that animals find rewarding. It should also allow animals to respond in positive ways to potential stressors. Such responses potentially allow animals to avoid or reduce their exposure to such stressors. Thus, a well-enriched exhibit space provides opportunities for performing behaviours such as hiding, climbing or running, as appropriate for the species.

WHY IS ENRICHMENT IMPORTANT?

Animals with good mental health tend to be engaged in their environment. Thus, they rest peacefully, without an over-expression of vigilance; behave in a fashion that is not overly fearful with minimal and non-exaggerated startle responses; assimilate new information, demonstrated through learned tasks or modified behaviours; perform no abnormal behaviours; and have a diverse behavioural repertoire that includes regular exploration and investigation. With regard to their physical health, animals should be able to be physiologically relatively stable, grow and reproduce effectively and also be supplied with opportunities to have appropriate forms of exercise.

Environmental enrichment promotes animals' mental and physical health by enabling them to engage in behaviours that give rise to a range of positive experiences. Such rewarding behaviours may involve food, space, temperature, social partners, activities such as swimming or dust-bathing, information gathering and many others.

Neuropsychologists have known for decades that animals raised in enriched environments have higher cognitive capacity than those from un-enriched environments. As early as 1947, for example, it was demonstrated that rats kept as pets were more capable of performing problem-solving tests than laboratory-reared rats. Later work demonstrated differences in brain anatomy between animals raised in enriched and un-enriched environments, and, importantly, that even adult brains remained capable of beneficial reorganisation of neural processing in response to enrichment.



Case study 3.1:

Providing choices by linking exhibits

Philadelphia Zoo has developed a 10-year plan for construction of a campus-wide network of animal trails that link exhibits for species with similar containment requirements and locomotion capabilities. This plan builds on and combines the concepts of species rotation and single-species connection systems already in use elsewhere. The Philadelphia Zoo plan includes three broad categories of trails: one for smaller arboreal species, including monkeys, lemurs and smaller carnivores; one for apes, bears and big cats; and one for large terrestrial species. The intent of the plan is to provide opportunities for long-distance travel and cross-species rotational usage of the trails themselves and, where appropriate, each other's 'home' exhibits. As one measure of impact, the trails have been used voluntarily and extensively by most species that have been given access. The trails have allowed some behaviours that are constrained in most of the 'home' exhibits; for example, sustained running, retreat from alarming stimuli, transport of food before consumption and inter-individual dispersal. Other observations include gradual and self-controlled approaches to novel stimuli and vocalisations not heard in the 'home' exhibits.

PHILADELPHIA ZOO, PA, USA
Colobus monkey in a linked species habitat.

While basic science has determined many positive effects of environmental enrichment, practitioners in zoos and aquariums have also played a substantial role by their innovative application of the science to specific enrichments. This has had a positive impact on animal welfare. Research based in zoos and aquariums demonstrates that enriched compared to un-enriched animals show a broader range of normal behaviours, express fewer abnormal behaviours and maintain more appropriate social interactions. Exposure to complex and enriched environments may also improve an animal's ability to cope more effectively with change and animals are likely to be more responsive to training, making the options for their care more inclusive. Indeed, there are numerous positive welfare outcomes for enriched animals.

PROVIDING 'CHALLENGES' AND 'CHOICES'

Experienced zoo and aquarium practitioners use 'challenges' to engage animals. These may include physical or cognitive challenges that require animals to perform some feat to acquire a reward or that require animals to solve a problem. A substantial literature on 'contra-free-loading' develops the case that many animals prefer to work to acquire food rewards than to simply have easy access to such rewards provided by animal keepers. To support animals working for rewards, Phoenix Zoo, for example, has implemented a zoo-wide contra-free-loading programme. Contra-free-loading should be used to provide challenges and choices that encourage positive states of welfare without inducing negative states, such as frustration.

Other problem-solving opportunities are likely to generate positive animal welfare outcomes. Animals in the wild face many different challenges and, although their behaviour in zoos or aquariums may not mirror that in their natural habitats, exhibiting a fundamental motivation to solve problems may still remain. Consequently, animal managers provide animals with puzzles to manipulate or other cognitive challenges. Of course, the animals should be capable of solving the problem or meeting the challenge presented to them, otherwise frustration may arise. Also note that good challenges may stimulate the animals' stress responses, so that physiological measures showing such responses under these circumstances would not necessarily be a matter for concern.

Providing animals with opportunities to exercise control over various activities—giving them 'choices'—is another fundamental feature of environmental enrichment. Choices can be presented in numerous forms; for example, related to social partners, individual enrichment items or locations for resting or feeding (*see case study 3.1*).

In essence, enrichment works by keeping animals' environments dynamically engaging. To assist with this, a predictive theory of environmental enrichment has been developed. The concept suggests that systematically varying a single feature of an animal's environment will help to determine the most effective way that enrichment should be presented (*see case study 3.2*).

**Case study 3.2:***Predictive theory of environmental enrichment*

A pair of fennec foxes (*Vulpes zerda*) housed at Brookfield Zoo were almost completely inactive and did not use their large exhibit. To test the concept developed in the predictive theory of environmental enrichment, a simple feeding device was installed that allowed food to arrive into the exhibit at several different locations at predictable or unpredictable times. Thus, researchers could vary the arrival of food in both space and time. Importantly, they found that predictability and unpredictability combined was more effective at stimulating natural foraging behaviour and attentiveness to the environment than complete predictability or complete unpredictability. They also found that the increased activity and range of behaviour led to zoo visitors staying longer at the exhibit.

ENRICHMENT THROUGH FEEDING AND FEEDING TECHNIQUES

Varying how animals are fed is perhaps the most widely used enrichment technique. Among numerous feeding-related enrichments, the time of feeding can be varied, as can the number of feeds offered and the locations where it is offered. The ways in which animals must search for food can vary and the time and activities committed to acquiring food by manipulating the size of food items and by placing them in structures from which they must be extracted can also increase enrichment. Feeding and feeding techniques need to be appropriate to the species, taking into consideration dietary requirements, social dynamics and other behavioural needs such as foraging.

In operant conditioning, positive reinforcement involves providing a favourable outcome, event or reward after a desired behaviour has occurred, which makes it more likely that the behaviour will occur again in the future. While obtaining food rewards may be one outcome associated with variations in food provision, in many cases there are other outcomes such as stimulating animals to search and determine information about their environment.

It is important to consider how the environment will remain dynamically engaging when designing exhibits, such that it continues to enrich the lives of animals living within (see Chapter 4). Exhibits can be designed with novel and enrichment feeding tools in mind, such as feeding poles for big cats. It is essential that animals be engaged by components of the environment that they can come to understand and over which they can exert some control. Ease of placement of enrichment objects that include food is also important, so that enrichment becomes an easy-to-accomplish component of daily animal care.

USE OF LIVE FOOD FOR ENRICHMENT—WELFARE CONCERNS?

To date, there are few studies on the enrichment effects of feeding live animals to predators. Two studies found that feeding live fish to cats both reduced abnormal behaviour and resulted in a more diverse behavioural repertoire. However, each of these studies also used an alternate treatment that achieved positive behavioural outcomes—either food was hidden in numerous locations throughout the exhibit or animals were given large bones to gnaw. The goal of any enrichment strategy involving live feeding must be carefully considered. It is important that the goal of the enrichment is properly evaluated, alongside its potential negative welfare impacts on the prey. Consideration of whole-of-life care must be given to all animals in our care, including those used in live feeding.

Although there are varied approaches globally on live-feeding practices, zoos and aquariums should, where relevant, investigate non-live feeding options to promote positive animal welfare outcomes. Consideration may be given to using animal ethics and welfare committees with external memberships to assist with reaching decisions on these matters.

MEASURING THE EFFECTIVENESS OF ENRICHMENT

It is important to measure the effectiveness of environmental enrichment. This is to ensure that resources are being used effectively and that the enrichment being used does indeed procure animal welfare benefits. In addition, enrichment assessment helps to build cooperation and improvement within the zoo

BROOKFIELD ZOO, IL, USA
Fennec fox

and aquarium community. Sharing successes and failures benefits the entire zoo and aquarium community. This can be done at a regional level or more widely through shared website resources.

A key issue in assessing the effectiveness of enrichment is comparing the behavioural outcomes against expectations. Disney's Animal Kingdom developed the 'SPIDER' framework for planning and evaluating enrichment schemes. This is a useful tool that guides staff to *Set* goals, *Plan* an approach to enrichment, *Implement* the enrichment, *Document* outcomes, *Evaluate* those outcomes in comparison to the set goals, and *Re-adjust* implementation if necessary.

VISITORS AND ENRICHMENT

Although visitors' expectations may not have a direct impact on animal welfare, they have the potential to increase zoo and aquarium commitment to environmental enrichment. As visitors' expectations have risen sharply, many now anticipate that zoos and aquariums will actively work to keep animals healthy and engaged. Thus, it may be beneficial to tell visitors about enrichment activities and how they make important contributions to animal welfare. Many zoos and aquariums have website pages that provide information about enrichment and showcase their enrichment work.

Some zoos and aquariums also celebrate 'enrichment days' where visitors are provided with opportunities to help make enrichment items and learn about their relevance. Although many animal managers feel that unnatural, yet effective, enrichment items detract from visitor experience, a limited number of studies on the subject provide no clear evidence that viewing these items reduces visitors' opinion of the exhibit. Moreover, visitors appear to appreciate knowing that animals are provided with enrichment. When animals are active and engaged, as they tend to be with enrichment, visitors tend to observe them longer and the opportunity to learn from the exhibit increases.

CONCLUSION

Environmental enrichment is a proven approach to maintaining animals' physical and mental health in zoos and aquariums. Enrichment can take many forms, but the overall goal is to provide a dynamically engaging environment that provides challenges for animals. These challenges should be within the scope of the animals' capabilities and animals should succeed in overcoming them more often than not.

The primary difficulties associated with enrichment are maintaining dynamic environments for animals within the confines of the animal-care staff working hours. It is important to remember that animal welfare is not the expression of only a few moments in an animal's day but of the cumulative experiences an animal has over time. Environmental enrichment programmes should always consider an individual animal's needs and changing requirements over time.

CHECKLIST

- Do you have an effective enrichment programme or activities in place?
- What is the goal of the enrichment programme for the animal? What behaviour would you like to see increased or decreased?
- Do you regularly review and change enrichment activities?
- Do your staff members use positive reinforcement as an enrichment tool?
- How many times a day do staff members interact with the animal or adjust its exhibit for enrichment purposes?
- How do you document and evaluate the efficacy of the enrichment programme?
- How do you share your successes and failures with the rest of the zoo and aquarium community?

NOTES:



TROPICAL EXPERIENCE WORLD GONDWANALAND
LEIPZIG ZOO, GERMANY



PLAN

Our commitment is to have exhibits that provide opportunities to meet animals' physical and behavioural needs.

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Define environmental characteristics that support species-specific good animal welfare and include these as primary criteria of all exhibit design and upgrades; ensure species-appropriate features based on up-to-date, science-based advice.
2. Seek to ensure that the animals' physical and behavioural needs are met. Provide environmental challenges that encourage curiosity and engagement, as well as choice of access to natural elements, including seasonal changes. Also accommodate the changing needs of an animal or group of animals over time.
3. Ensure that exhibits allow opportunities for separation of animals as required for animal welfare management.
4. Ensure that staff members can safely and easily engage in maintenance, care and training to enable animals to lead rich and fulfilling lives without undue stress or injury.
5. Institute monitoring to assess the quality of exhibit design. Find creative solutions and share them with others.
6. Explain animal welfare on exhibits and provide visitors with information about personal actions they can take to improve the welfare of animals anywhere.
7. Consider the provision of features that allow the animals' continuous species-appropriate multiple choices or control over their environment.

INTRODUCTION

The quality of life of any animal is determined by a series of variables, including genetics, previous experiences, the overall quality of the environment and the opportunity to exercise choice in seeking comfort, sustenance and social engagement. Although animals have no control over their genetic makeup and the overall quality of the environment, an individual in the wild or in a zoo or an aquarium can exercise a degree of control over its well-being by choosing to move from place to place in search of different behavioural opportunities, social choices and an ability to express personal preferences.

On any one day, an animal might find itself being more or less comfortable, more or less hungry, or under stress from a variety of external factors. An important aim of exhibit design is to provide animals with opportunities to keep mentally, emotionally and physically fit through dealing with such daily stressors and availing themselves of opportunities to have positive experiences.

Historically, zoos and aquariums have specialised in bringing animals into a human-regulated environment where care-giving was substituted for the animal's 'free-will' or wild state. While many of these animals seem content and outlive their wild counterparts, longevity is not necessarily an indicator of animal welfare. As zoos and aquariums better understand the species and animals for which they care, exhibit design must incorporate whole-of-life needs, expand space allocations, provide a variety of environmental enrichment features and increase opportunities for appropriate social interactions with other animals.

THE ROLE AND STYLE OF EXHIBIT DESIGN

In modern zoos and aquariums, exhibit design takes on two important roles. First, to create a flexible framework where animals have enough space and opportunities for challenge and choice within their own behavioural repertoire, and where staff members are always safe in the proximity of animals and have options to challenge and support the animals' predilections. Second, to design a 'stage set' that supports visitors' opportunities for intuitive environmental learning—where visitors' emotional and intellectual needs are satisfied by understanding how the setting and situation allow the animals to thrive, as well as what the visitors might do to support animal welfare.

There are two main approaches to the style of exhibit design, namely landscape immersion and abstract ecology. The landscape immersion style incorporates natural and sometimes cultural components of the animals' native land. Both the natural and cultural components transcend the exhibit barriers in each direction, placing visitors in a shared setting with the animals. Landscape immersion is a form of 'naturalistic' or 'soft' architecture. This style of exhibit design facilitates intuitive environment learning.

The abstract ecology style uses abstracted elements of the animals' native habitat. Examples include a climbing structure instead of a living forest for brachiating primates, or a geometric concrete formation to represent icebergs in an arctic species exhibit. This style of exhibit design is referred to as 'mechanistic' or 'hard' architecture. Abstract ecology can be more economical, thus saving money for enhancing other animal welfare features.

Neither one of these approaches to the styling of exhibits is inherently better for animals than the other. A beautifully designed canyon with a backdrop of trees may convince visitors that they are in the native environment, but it may



DUBLIN ZOO, IRELAND
Western lowland gorilla

Case study 4.1:

Gorilla habitat design innovations

The Gorilla Rainforest habitat at Dublin Zoo, opened in 2011, is unique in the way it matches respect of existing landscape and the behavioural history of western lowland gorillas (*Gorilla gorilla gorilla*), and successfully recreates the character of their home place. The habitat consists of a large natural swamp; a total of 6,000 m² of undulating topography gives the gorillas several diverse habitats resembling the grassland, forest and river matrix of their ancestral home. The habitat design was guided by behavioural studies of gorillas in the wild. Visitors explore this tropical biome along a continuous boardwalk. They traverse cascading streams and enjoy views of close and remote landscape and sky, and distant views across a lake to other animal habitats. Visitors come upon formal viewing areas, a play area, an overnight camp and educational opportunities. Discovering and observing the gorillas requires patience, but even if the gorillas choose to avoid detection, the walk itself is an enjoyable experience, with opportunities to observe a troop of red-capped mangabeys (*Cercocebus torquatus*) sharing the habitat with the gorillas, as well as local wildlife.

not be beneficial to animals unless it offers a variety of conditions and activities appropriate to the resident species. Conversely, a jungle gym may be very exciting for gibbons even though it does not visually evoke a natural forest. Regardless of style, it is the species-specific environmental enrichment features, the amount of choice and stimuli, and the ability of the animal to engage in natural behaviours that matter.

EXHIBIT DESIGNS AND ANIMAL WELFARE

How can we design spaces that enhance the fitness, health and welfare of their inhabitants?

Appropriate species selection is one of the first principles of exhibit design. Species should be naturally comfortable in the zoo's or aquarium's climate or kept comfortable through artificial environments (see Chapter 5). Physical and landscape characteristics and limitations of space also play a role in determining which species are appropriate. Animals found together naturally in the wild can benefit from mixed-species exhibits and inter-species behaviours can be displayed that would otherwise not be performed in single-species habitats. However, consideration needs to be given to the species

and individuals involved, as some mixed-species exhibits can lead to over-aggressive behaviour, injuries and death, if not managed correctly.

Exhibits should always be designed in a manner that not only considers safety of staff and visitors, but also provides a space where the animal feels safe. Successful exhibit design starts with a thorough understanding of each species' behavioural repertoire over its lifespan (birth, development, maturity, geriatrics and death), and the ways it makes use of its natural landscape. This is a collaborative effort and should involve biologists, animal welfare scientists, animal keepers and researchers who study wildlife in their natural habitats (see case study 4.1). Evidence-based design (EBD) can provide valuable information about what has worked in the past and post-occupancy evaluation (POE) techniques can be used to monitor the effectiveness of the exhibit design.

The scale and scope of an exhibit habitat should accommodate each species' range of needs and behaviours. For some species, three-dimensional space will be an absolute priority and essential to achieving positive welfare states, while for others appropriate social structures will be a priority. Knowing specific species requirements is essential for effective animal welfare exhibit design.

For example, consider how animals use all three dimensions of their natural space, imagine the day-to-day details of their lives and look at their available choices for light and noise levels as well as temperature range. Provide access to natural light. Design for the provision of environmental enrichment and challenge to support animals' opportunities for self-motivated choice.



Case study 4.2:

Advance in animal management style propels advance in exhibit design

Apenheul Primate Park, opened in 1971, pioneered free-range exhibits for primates via experimenting with fences, electrified bridges and social learning of primates. In the first free-range area, which occupies approximately 1 ha of forested area, more than 100 black-capped squirrel monkeys (*Saimiri boliviensis*) roam in the trees and among visitors. The space given to the animals allows them to form rewarding social groups. The holding rooms provide flexibility for the group members to position themselves within the group: each of the eight holding rooms features at least three exits, with each exit leading through an intersection to multiple other rooms. The building has wall rather than floor heating, the target temperature being 25 °C for the wall and 20 °C for the air. An animal that needs to be kept in the isolation room due to injury or illness is always accompanied by a companion selected by the animal keepers based on their knowledge of the group.

Animals should be able to form natural groups (*see case study 4.2*). Prepare for breeding events and to separate animals for welfare reasons. A complementary off-exhibit area or a second exhibit may be needed. Off-exhibit areas, although out of sight of visitors, should be built around specific animals' needs just as exhibits are. Both exhibit and off-exhibit areas should provide safe, easy and flexible options for staff members to engage in maintenance, care, training and observation. Rotating animals on exhibit and to off-exhibit areas may provide additional positive stimuli.

Ideally, staff members should be able to change environmental enrichments and engage in other daily tasks without interfering in the animals' natural behaviours, both to prevent disturbance and to avoid conditioning that leads them to become dependent on human intervention. Thus, design should enable use of flexible systems for placing environmental enrichment to allow for daily variety and challenge. It should also incorporate appropriate management and care devices, such as scales, squeezes and capture chutes, so that animals, regardless of their size and complexity, may more easily accept non-invasive medical procedures through positive reinforcement training.

Retreat areas should be incorporated into exhibits, so that animals, if they choose, can escape from public view. From an educational perspective, explaining the welfare features of exhibits helps visitors to better understand animals' needs. Studies show that animals' need for occasional privacy is recognised by educated visitors who then do not expect to see every animal at every visit. Such explanation can inspire connection and can motivate visitors to take an interest in the welfare of animals in zoos and aquariums as well as their conservation in the wild.

CONCLUSION

A well-designed zoo or aquarium space, along with attentive animal management, can do much to enhance the fitness, health and welfare of its inhabitants. Providing choice within an exhibit and ensuring areas for rest and retreat from visitors can make a notable difference to an animal's welfare. Equally, it can provide opportunities to observe animals as fully sentient individuals whilst they engage in a rich variety of choices and a complex repertoire of behaviours that reflect their own curiosity and individual use of their habitat.

Zoos and aquariums should strive for best practice, lead by example and encourage new ways of thinking about and designing for animal welfare. The solutions do not have to be expensive, but good outcomes require thoughtful, thorough and bold effort.

APENHEUL PRIMATE PARK, THE NETHERLANDS
Black-capped squirrel monkeys

CHECKLIST

- Is the species naturally comfortable in the zoo's or aquarium's natural climate or can it be kept comfortable through access to artificial environments?
- Does the exhibit allow for an animal to regulate its basic condition; to access sunlight (or moonlight in nocturnal species) and the outdoors at their choice?
- Do the animals use the 'third dimension' such as height or depth; do they enjoy trees or digging in various substrates? Are resting places incorporated and does the exhibit allow for normal movement?
- Is the exhibit large and complex enough to support the species' natural grouping? Are complementary exhibits available to accommodate breeding or the fracturing of a social group?
- Is the exhibit providing for multiplicity of opportunities, such as feeding and resting, in varied conditions (being near or far, in shade or sunshine, elevated or low, protected or exposed to elements)? Does it provide escape and retreat areas for animals? What triggers aggression?
- Are animal keepers safe around the animals? Does the exhibit provide easy flexible options for daily maintenance and environmental enrichment?
- Does the exhibit allow staff members and researchers to monitor the animals without disturbance? Are animals on exhibit protected from disturbing light, noise or vibration associated with being viewed?
- Are animals safe from visitors? Are visitors safe around the animals?
- Is the welfare of animals on exhibit well understood by visitors? Can visitors observe animal faculties, feeding strategies, self-care, social interactions and use of environmental enrichment? Is the visitors' experience tied to understanding the challenges of the species' survival in the wild?

NOTES:



Ocelot



GIANT PANDAS
SAN DIEGO ZOO, CA, USA



COLLABORATE

Our commitment is to breeding programmes that achieve conservation outcomes, sustainable species management and promote positive animal welfare states.

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Introduce and follow breeding plans and species management recommendations that align with overall species conservation plans and seek to minimise negative welfare consequences for animals.
2. Facilitate positive welfare management during breeding events through using, for example, oestrus monitoring, animal separations and ongoing skilled observation.
3. Use professional staff, by external specialist input if necessary, to oversee breeding-related animal welfare issues.
4. When breeding animals for release, give specific attention to balancing animal welfare with survival in the wild and replenishment of wild populations.
5. Develop and use a clear euthanasia policy, which outlines the circumstances for the use of euthanasia and those who are mandated to perform it.
6. Ensure that species-specific animal welfare considerations are fully integrated into long-term collection planning that guarantees animals can be provided with whole-of-life care and a high level of welfare throughout their lives.
7. Ensure that in considering inward animal transactions, all animals come from sources that do not impact on wild populations or reinforce commercial production of wild animals where animal welfare may be compromised.

INTRODUCTION

Breeding can involve positive, enriching forms of natural behaviour for wildlife species in zoos and aquariums; however, it can also raise complex ethical and welfare issues. An overarching principle in considering any breeding event in zoos or aquariums should be the balance between animal welfare and the needs and tools for population management, informed by expertise in species-specific natural behaviours.

With the predominant objective of modern zoos and aquariums as wildlife conservation, interpretation of how we might achieve this through breeding programmes varies. However, there are common themes emerging that include species-specific expertise and knowledge underpinned by a strong cooperative planning approach.

ANIMAL COLLECTION MANAGEMENT AND BREEDING

Breeding programmes in modern zoos and aquariums should be managed through species management programmes involving good planning in cooperation with specialist zoo and aquarium organisations, such as regional zoo and aquarium associations. Collaborative species management should underpin all decisions about animal breeding and animal collection planning.

Animal collection planning should be core to all zoos and aquariums (*see case study 5.1*). With regard to animal welfare, such planning should include consideration of the ability to provide positive welfare states for certain species or particular animals as being fundamental to whether or not they should be held.

In many areas around the world, it is the role of the regional zoo and aquarium associations to coordinate and assist with managing animal populations, by supporting collection planning, ensuring good species management practices, and overseeing and advising on how to promote positive animal welfare states within that framework. This is also a growing area of global coordination via Global Species Management Plans (GSMPs) through the WAZA Committee for Population Management (CPM). Zoos and aquariums should continue to use these programmes and, where possible, collaborate to further build regional and global breeding programmes.

High-quality record keeping is pivotal to successful species management, as the underlying principle of management is to cater for the relatedness of individuals in the population and the species-specific outcomes from an animal welfare perspective. The International Species Information System (ISIS), incorporating its Zoological Information Management System (ZIMS), is one such system that is vital for global management of sustainable populations. This system enables the dissemination of information that will help to build knowledge of successful animal breeding.

'NATURAL' BREEDING IN A ZOO OR AQUARIUM

In recent times, concerted efforts have been made in zoos and aquariums to allow individual animals to breed in situations that closely mimic natural processes. This is based on a need to ensure breeding success and may have some beneficial welfare outcomes. Overlying this is a complex system of species management that aims to maintain sufficient genetic and demographic diversity to promote sustainability of zoo and aquarium animal populations and support wildlife conservation.



PERTH ZOO, AUSTRALIA
Bilby joeys

Breeding programmes in zoos and aquariums strive for as much genetic diversity over generations as possible. Ensuring genetic diversity is important for animal welfare as it contributes to animal health in individual animals and also inter-generationally. Well-managed breeding programmes must consider animal welfare, with zoos and aquariums making every effort to balance the ethical and welfare issues with the need to sustainably manage populations. The assistance of animal ethics and welfare committees, or other such entities, can help to address the complexities of decision-making in these areas.

Zoos and aquariums can beneficially work collaboratively with other partners to access or further develop technologies that integrate the minimisation of animal welfare compromise and the maintenance of positive welfare states with sustainable species management. For example, some breeding programmes employ hormone testing, assisted reproductive techniques, stress monitoring and application of the latest species-specific knowledge. These approaches may be overlaid with non-invasive animal management techniques using positive reinforcement to minimise harm and stress.

The conduct of breeding programmes should be part of broader long-term species management planning that considers whole-of-life care and high levels of animal welfare. Many zoos and aquariums actively manage reproduction to avoid unwanted breeding events. Others may use euthanasia, should this be legal and culturally appropriate in their country or region.

Case study 5.1:

What is an animal collection plan?

An animal collection plan outlines the species and numbers of animals held, planned breeding, animal movements in or out of a zoo or aquarium, and future directions. Leading zoos and aquariums align animal collection planning decisions with collection planning principles and related policies endorsed by the responsible institution's governing authority. A collection plan takes into consideration the facilities available, exhibits and spaces on public view and behind the scenes, species requirements for both welfare and management, and the need to maintain a collection that aligns with the zoo's or aquarium's purpose and mandate. Zoos and aquariums should develop collection plans to support the delivery of conservation objectives, either through direct conservation outcomes or through visitor/public engagement outcomes.

The effective use of contraception is one of many aspects of managing a modern zoo or aquarium and as such the expertise and knowledge of veterinary staff members is vital to successful reproductive management. Managed reproduction is also essential to support conservation programmes to ensure the best genetic and demographic outcome for future breeding.

MANAGING AGGRESSION AND HARM

Another core expertise of modern zoos and aquariums impacting on animal welfare is the management of natural behaviours within the contained area of an exhibit. For many species, breeding can result in high levels of aggression between animals, and injury (*see case study 5.2*). This may be a common wild behaviour for the species. Zoos and aquariums work hard when managing such scenarios to minimise possible harm, as poor management in this area can result in serious animal injuries and deaths.

Should aggression occur, exhibit design should complement and accommodate safe animal breeding. Zoo and aquarium staff should have detailed knowledge and expertise regarding managing animal introductions, in order to minimise animal injury and achieve the best breeding outcome. Additionally, the use of science that assists zoo and aquarium professionals to determine the appropriate time for breeding introductions is essential.

**Case study 5.2:***Managing aggression when breeding herd species*

Ideally, breeding should occur within the herd for good animal welfare and cohesive group dynamics. Zoos and aquariums should be mindful of herd genetic and demographic integrity in considering breeding, in conjunction with the broader management of the species involved. The nature of herd species, particularly with males, is that there will be times during the year where antagonistic behaviour may arise. Natural breeding behaviours, whether aggressive or not, may be vital to ensure successful breeding. However, if antagonistic behaviour in breeding situations is ongoing, particularly outside the normal breeding season, this could become an animal welfare issue for the subordinate individual and should then be addressed. Again, zoo and aquarium staff members should have good knowledge and expertise of direct relevance to the species, the individual animals and the likely group dynamics. This will assist decision-making about separating individuals or allowing aggressive behaviour to take its course.

WHITE OAK CONSERVATION CENTER, FL, USA
Somali wild ass

BREEDING FOR RELEASE

The long-term sustainability of display animal populations and the provision of animals for conservation breeding are not mutually exclusive. In many cases, animals used for conservation breeding purposes are also on display to the public, while in other scenarios, individuals involved in such breeding programmes will be held off-display. Whether or not to display these breeding animals is dependent on the particular programme and the species.

Many breed-for-release programmes undertake pre-release conditioning that may lead to a transient reduction in animal welfare. Pre-conditioning may involve, for example, manipulating an individual's diet to mimic more closely the diet in the wild, such as limiting food resources (e.g. gorge-and-starve diet); introducing live prey items (which can raise concerns for the welfare of the prey animal); or introducing predator conditioning that instigates a flight response. Prior to committing to a breed-for-release programme, zoos and aquariums should assess if the long-term survival risks to the individual animal, and the ongoing survival of its species, outweigh the transient compromises to animal welfare during the pre-release conditioning stage. Input of others through an animal ethics and welfare committee can significantly assist in assessment and support of such a situation, in addition to the input of conservation authorities.

TRANSACTIONS FROM THE WILD, RESCUES AND FARMING

All transactions from the wild should comply with global principles as endorsed through international conservation bodies, such as the International Union for Conservation of Nature (IUCN). It is central to the modern zoo or aquarium that the intention of removing an individual from the wild must have a clear and proven conservation purpose, or, when working with responsible authorities, the purpose targeted should be education, research or collecting individuals for programmes that aim to promote the long-term sustainability of wild populations (e.g. breed-for-release initiatives). Effective zoo and aquarium animal collection planning, species management and cooperative breeding plans are essential tools in this regard.

The commercial production of wild animals ('wildlife farming') can stimulate unsustainable and illegal sourcing of individuals from the wild, which can undermine the conservation remit of modern zoos and aquariums. The scale and intensity of such commercial production methods can also have a negative impact on wild animal welfare. Zoos and aquariums should avoid sourcing animals from commercial breeding facilities. Consistent with WAZA's 2014 resolution on this matter, zoos and aquariums, when considering inward animal transactions, should ensure that all animals come from reputable sources, do not impact on wild populations or reinforce commercial production of wild animals, and avoid the negative welfare consequences of indiscriminate capture.

Many zoos and aquariums increasingly take on 'rescue animals' as a result of seizures from illegal wildlife traders or from organisations that close or cannot care for animals adequately. This is often at the request of governments. In some jurisdictions, sanctuaries may exist to care for such animals; however, given their animal care expertise, modern zoos and aquariums are often well placed to provide long-term care for these animals.



Case study 5.3:

The Free the Bears Fund in Australasia

The Free the Bears Fund is an organisation that works across southeast Asia to rescue sun bears (*Helarctos malayanus*) and Asiatic black bears (or moon bears; *Ursus thibetanus*) from bile farms, the restaurant trade and the pet trade. Over the past 10 years, several Australian and New Zealand zoos have supported Free the Bears with funding for assistance to their sanctuaries, community education programmes and conservation research on the status of wild bears in Laos and Cambodia. Zoos have also taken rescued sun bears into their animal collections to support the Australasian regional breeding programme for sun bears, as well as to advocate for Free the Bears and sun bear conservation and to oppose the illegal trade in wildlife.

Caring for rescue animals provides clear opportunities for public education on key themes in animal welfare and conservation, such as the growing global illegal wildlife trade (see case study 5.3). In providing homes for rescue animals, zoos and aquariums can make a real difference to individual animals as well as boost the sustainability of regional and global zoo and aquarium animal populations. Considering the availability of space and resources for rescued/confiscated animals and their whole-of-life care may be an important component of animal collection planning.

USE OF EUTHANASIA

Euthanasia is the act of providing a humane death. Animals should be treated with respect throughout their lives and, when necessary, given a humane death. All zoos and aquariums should have clear policies to deal with the euthanasia of animals. Euthanasia policies should clearly outline the circumstances of how and why euthanasia will be used. Euthanasia should be overseen and approved by an experienced veterinarian or senior animal management staff member briefed by a veterinarian. Decisions on euthanasia should be based on context-dependent evaluation of all alternatives. Some institutions find it beneficial to involve an animal ethics and welfare committee, or other such entity that has external members, in such evaluations (see case study 5.4).

The death of an animal in a zoo or aquarium can evoke public interest as well as emotion from staff members, volunteers and the visiting public. This may particularly be the case when the animal has been euthanised. In some circumstances, zoo and aquarium visitors, staff members and volunteers may need an explanation of the rationale of the euthanasia decision and it may be beneficial and necessary to take time to explain the reasons.

PERTH ZOO, AUSTRALIA
Sun bear



Case study 5.4:

What is an animal ethics and welfare committee and how can it work for your organisation?

Many zoos and aquariums use an animal ethics and welfare committee to assist in the management of animals in their organisation. In some jurisdictions, this is required by law. Animal ethics and welfare committees can have external members to broaden your organisation's community connection and access external animal welfare and animal ethics expertise. Such committees can be valuable to gauge your community's responses to animal management issues; inspect facilities; can consider new policies and procedures in animal welfare; or can assist with complex ethical issues that may arise in animal care. Such committees can also promote greater understanding of the complexities of zoo and aquarium animal management among staff and other participants. The process can also increase accountability and transparency for decision-making in animal care.

HOUSTON ZOO, TX, USA
Pygmy marmosets



EL VALLE AMPHIBIAN CONSERVATION CENTER, PANAMA
Rusty robber frog

USE OF ADVANCED BIOTECHNOLOGIES

Modern zoos and aquariums are using more technological advances to assist with breeding programmes, from using molecular genetics to identify valuable individuals in the breeding of threatened species to applying assisted reproductive technologies, including artificial insemination, embryo transplantation, intracytoplasmic sperm injection and *in vitro* fertilisation.

When undertaking assisted reproduction in zoo and aquarium animals, consideration should be given to the welfare of the individual animals involved. The risks, benefits and animal welfare outcomes should be fully explored when planning such events. Potential barriers to natural reproduction should also be considered.

CONCLUSION

Animal welfare and the balance between welfare compromise and positive welfare states should be integrated into the recommendations and decisions of breeding programmes and into zoo and aquarium collection planning.

High-quality zoo and aquarium collection planning must be based on a commitment to wildlife conservation and species management. This ensures that both the genetic and demographic integrity of zoo and aquarium populations and wild populations are maintained. It also provides opportunities for zoos and aquariums to educate the public about conservation and welfare. Zoo and aquarium staff members undertaking species management should be fully aware of regional and global priorities in relation to the species in their care, understand the benefits and limitations of current management methods and ensure high-quality record keeping.

CHECKLIST

- Do you have an animal collection plan?
- Do you have clear animal breeding plans in place, which are managed and agreed on prior to a breeding event?
- How do you incorporate animal welfare management into your breeding plans? Would you benefit from seeking expert advice about this?
- Are your staff members skilled enough to manage breeding events with complex or aggressive species? Is your infrastructure suitable to manage such breeding events? Do you need additional facilities and holding areas to better manage this?
- Are you confident that your zoo or aquarium can provide for the offspring that may result?
- How do you manage euthanasia in your zoo or aquarium? Is there a clear policy outlining roles and responsibilities and instances when euthanasia should be used? Would it be beneficial to include an animal ethics and welfare committee, or equivalent entity, in deliberations about euthanasia?
- Are there opportunities to better link conservation programmes with the breeding activities at your zoo or aquarium?
- Are your staff members active in species management and linked with regional zoo and aquarium associations active in this respect?
- Do you need to plan to increase future holding areas or do you need to partner with other institutions to accommodate aged animals or animals not required for breeding?
- Is your animal record keeping up to date and communicated through the Zoological Information Management System (ZIMS) or other similar cooperative programmes?
- Are you compliant with all procedures of the International Union for Conservation of Nature (IUCN) and with WAZA's 2014 resolution on legal, sustainable and ethical sourcing of animals?

NOTES:



North American porcupine



WHITE RHINOS
ZIMBABWE



CONSERVE

Our commitment is to ensure that our wildlife conservation activities incorporate animal welfare goals.

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Establish animal welfare as a component in all conservation activities and projects supported by your organisation.
2. Work with partner field conservation organisations and collaborate on animal welfare knowledge and skills that are relevant to their field operations, including, for example, reintroduction projects.
3. Evaluate whether the animal welfare implications of management interventions are outweighed by their conservation benefits.
4. Build understanding of the importance of integrated species conservation frameworks that include assessing animal welfare.
5. Make sure that in your conservation work, and the work of your conservation partners, the review of an individual's needs and the promotion of positive animal welfare is considered at all times.

INTRODUCTION

The term 'conservation welfare' emphasises the major theme of this chapter that animal welfare and conservation are intrinsically bound together. It emphasises that sound animal welfare principles and practices should be embedded in conservation activities and be integrated into how modern zoos and aquariums operate from day to day.

Conservation welfare acknowledges that any human activity that intentionally or unintentionally impacts on sentient animals in their wild or natural environments has the potential to cause animal welfare compromise. For example, the welfare of countless wildlife species is compromised directly and indirectly by human activities, threatening the survival of populations, species and ecosystems.

CONSERVATION AND ANIMAL WELFARE—NOT A DICHOTOMY

Conservation and animal welfare both focus on harm to animals, but their orientations differ. Whereas conservation is concerned mainly with the survival of populations, species and ecosystems, animal welfare emphasises the subjective experiences or quality of life of individual animals. Also, conservation thinking and practice embrace a wide range of activities mainly involving free-living wildlife as well as wildlife in human care in as much as they can contribute to conservation aims.

There is strength in close collaboration and alignment between conservation and animal welfare. After all, should the adverse impacts on wild animals—caused by virtually all forms of human activity—be classified as conservation problems or animal welfare problems? Wild animals are parts of social groups, populations and ecosystems. Hence, actions affecting the welfare and survival of individuals can also have consequences for these larger systems, and *vice versa*.

As explained in *Chapter 1*, zoo and aquarium animal management that is focused mainly on survival-critical factors can, at best, usually only achieve neutral animal welfare states. Today, we expect more, so that more is required than merely meeting the minimal survival needs of animals held for conservation purposes, as may have occurred in the past. As animals can also have positive experiences, our zoo and aquarium management processes should strive to make this possible and enable this to occur. The recurrent theme in this Strategy, that the widespread attention already given within the zoo and aquarium sector to environmental enrichment should be continued and expanded, includes its greater application to animals held for conservation purposes. It is apparent that this orientation harmonises with the concept of conservation welfare, as it incorporates the aim of enhancing animal welfare whilst pursuing conservation objectives.

CONSERVATION WELFARE IN ZOOS AND AQUARIUMS

Examples of conservation welfare in operation include reconciling animal welfare and conservation interests in wildlife management, wildlife research or ecotourism (*see case study 6.1*). Many zoos and aquariums are involved in diverse conservation activities in their local area and also further afield. Zoo and aquarium conservation welfare must be applied to these broader activities through concern with the physical and psychological well-being of individual members of wildlife species in intensively managed populations in a conservation context.

Good zoo—or aquarium—based conservation practice—seeks to manage animal welfare well. Advances in caring for wildlife species can improve their welfare (*Chapters 1 and 2*) as well as the success of breeding programmes (*Chapter 5*). Building on this expertise, zoos and aquariums can help partner conservation organisations that work in the field to aim for high animal welfare standards.



Case study 6.1:

Welfare implications of handling wildlife species

Intentionally intervening in the lives of wildlife species for conservation purposes can have impacts on the welfare of the individual animals concerned. Even simple observations may have an effect. Hence, handling such animals for sample collection, marking, tagging, vaccination and treatment can have negative welfare impacts. The adverse effects associated with such deliberate interventions may evoke biological costs. Examples include physical damage, disruption to social hierarchy, disruption of natural movement, disruption to breeding behaviour or increased vulnerability to predation. Thus, these effects may alter the biology of individuals to the extent that the data they provide could be unreliable. Zoos and aquariums have the competency needed to develop welfare-friendly handling protocols for wildlife species. They also provide a testing ground for measuring the potential animal welfare consequences of such conservation interventions. This, in turn, provides links between zoos and aquariums, animal welfare and conservation.

MYAKKA CITY LEMUR RESERVE, FL, USA
Mongoose lemur

“

There is strength in close collaboration and alignment between conservation and animal welfare.

”

NORTH CAROLINA, USA
Red wolf

Potential conflict between animal welfare and conservation objectives may arise in cases where species are not apparently able to adapt to being kept in zoos or aquariums. Conversely, adaptation to managed environments may reduce an animal's capacity to adjust to the wild, raising welfare concerns for those that are destined to be returned to their natural habitat (*see case study 6.2*). Thus, many zoos and aquariums involved in breed-for-release programmes adopt strategies aimed at mitigating such potential problems.

Given rising conservation urgency, it is becoming increasingly necessary to intervene in the management of wildlife and their environments in order to mitigate threats. The impetus for such interventions may be to mitigate animal welfare problems, manage disease outbreaks or meet a conservation priority to undertake animal translocations. Also, it is likely that some species will not survive without human intervention. However, interventions may themselves compromise the welfare of individual animals and such impacts need to be traded-off against the anticipated contribution to the broader aim of species conservation.



Case study 6.2:

Welfare of reintroduced animals

Reintroductions are interventions that highlight, within the animal welfare-conservation nexus, a duty of care for the individual animals to be reintroduced as well as for the population to be restored. Releasing individual animals to the wild after periods of human care, which may include preparing animals for release, may compromise their welfare, as well as have an impact on other local species. Pre- and post-release monitoring and supportive measures, which may include providing conspecific tutors, supplementary feeding or veterinary care, can improve both reintroduction success and animal welfare. Behavioural and environmental enrichment, targeted at developing specific skills important for survival and reproduction in the wild, can have equal value. Zoos and aquariums have the expertise required to take such management actions. This, in turn, highlights a key role for zoos and aquariums in the animal welfare and conservation arena.

INTEGRATING SPECIES CONSERVATION AND ANIMAL WELFARE

It is apparent that integrated management of species within and outside their natural habitats is becoming increasingly important. Such management involves a range of activities that often include the capture, restraint and transport of animals, where minimising animal welfare compromise and providing opportunities for positive experiences become key issues. It is therefore necessary to assess the animal welfare implications and determine if the consequences of an intervention are outweighed by conservation benefits, and *vice versa*.

The knowledge within zoos and aquariums of animal welfare and care can benefit conservation efforts in areas such as the recovery and management of small populations, translocation biology and conservation medicine. Importantly, seeking to improve the welfare of wildlife does not necessarily conflict with conservation aims, because measures taken to enhance animal welfare may, by improving survival and reproductive prospects, enhance the conservation value of the whole endeavour.

The relationship between animal welfare and conservation can be represented in a decision schema for considering the intersection between separate dimensions of the two objectives (Fig. 6.1). Practices that combine good animal welfare with good conservation are preferred, whereas other practices are less desirable but still acceptable, and, clearly, the combination of poor animal welfare and poor conservation is unacceptable. Indices of minimised welfare compromise and enhanced welfare (Chapter 1) provide practical means for assessing these practices.

Good conservation practices can and should be implemented with close consideration of the welfare of individual animals. Thus, this decision schema may be especially helpful when pressure to disregard individual welfare in the interests of conservation is high, as it helps to keep in mind both animal welfare and conservation concerns.

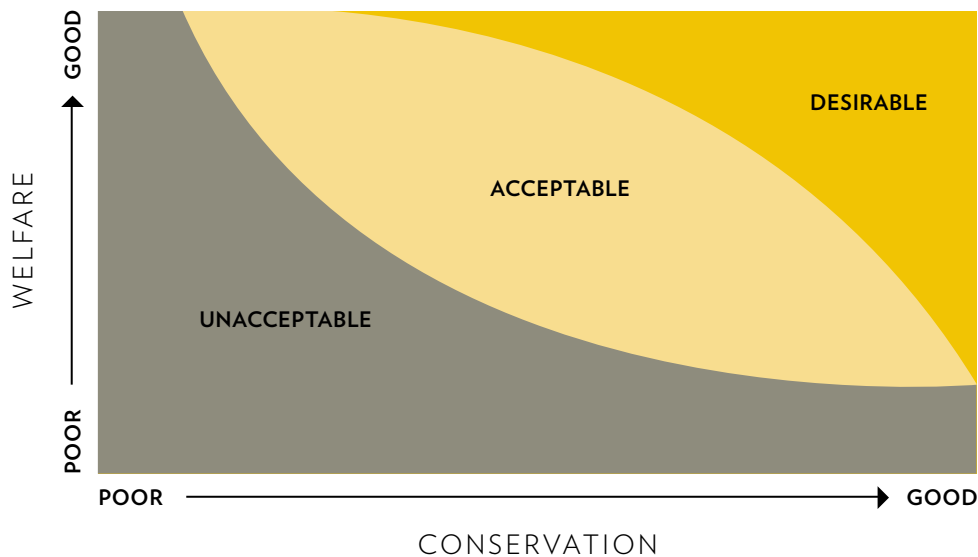
GUIDING PRINCIPLES AND UNRESOLVED QUESTIONS

There are no universally agreed principles guiding those who work with wildlife welfare and conservation. However, a useful framework, slightly modified here, has been provided by principles suggested in a consensus statement arising from a 2009 Conservation and Animal Welfare Science Workshop held at the University of British Columbia:

- The welfare of all individual wildlife species is of equal moral concern. This does not mean that all such animals must be treated equally, just that their well-being should be given equal consideration.
- Actions that affect animals are of moral concern whether they exert their effects directly or indirectly.
- Actions that might harm the welfare or conservation status of wildlife should not be undertaken without careful consideration of the necessity of the action.
- The severity and scale of harm (in terms of the number of animals affected and the duration of the harm compared to the lifespan of the animal) should be minimised.
- Actions with irreversible impacts should be considered to be more serious than those with transient impacts.

DECISION SCHEMA

Fig. 6.1. A decision schema for considering the intersection between the separate dimensions of animal welfare and conservation (modified from Bradshaw & Bateson 2000).



Many issues relating to wildlife welfare and conservation require further consideration. The following is an initial list of unresolved questions raised at the above-mentioned workshop:

- Given that suffering can occur in the normal lives of animals, what baseline should be used to determine when harms caused by human activities are of moral concern? Although consensus and quantification may be difficult to achieve, we should not conclude that all levels of suffering are therefore acceptable.
- How direct a link with human behaviour should be demonstrated in order for it to generate concern?
- How do the affective states of individual animals map onto outcomes important to conservation, such as disease status or reproductive success?
- Can we identify principles that lead to morally defensible actions when it is necessary to severely compromise the welfare of some individuals in order to achieve goals such as the survival of a population?

Resolving such issues will require cross-disciplinary dialogue involving conservation biologists, animal welfare scientists, and those working on ethics, law and social issues.

CONCLUSION

It is increasingly important to recognise the relevance of animal welfare when dealing with problems of wildlife conservation. The same human activities driving the current biodiversity crisis are compromising animals’ welfare and these interlinked concerns attend the work of zoos and aquariums on conservation and saving wildlife species.

The welfare of wildlife species can be directly and indirectly assessed in increasingly sophisticated, scientifically validated ways. The fact that animal welfare is assessed on an individual basis, whereas some wider goals of wildlife conservation are measured on populations or species, does not necessarily make them incompatible.

Animal welfare and conservation scientists and advocates are increasingly recognising each other’s work as complementary. Zoos and aquariums need to ensure that their conservation work in the field, and the work of their conservation partners, include strategies aimed at minimising welfare compromise.



CHECKLIST

- Do you undertake reviews of conservation projects to ensure that the animals’ welfare needs are met?
- Would your conservation partners benefit from support for incorporating effective animal welfare management procedure in their work?
- Do your staff members and conservation partners need advice on how to directly and indirectly assess the welfare of wildlife species?
- Are your staff members who work in conservation projects, which include, for example, the capture, restraint and transport of wildlife, adequately trained to meet the animals’ welfare needs?
- If you undertake breed-for-release programmes, do the holding facilities meet the animals’ welfare needs?

NOTES:

HANNOVER ZOO, GERMANY
Atlas beetle larva



AMUR LEOPARD
LEIPZIG ZOO, GERMANY



UNDERSTAND

Our commitment is to adopt a scientific, evidence-based approach to animal welfare and when conducting research.

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Prioritise animal welfare and welfare monitoring as areas for research in collaboration with universities, research bodies and other zoological institutions.
2. Continue to use and apply findings based on sound scientific research to support good animal welfare in zoo and aquarium management.
3. Use an animal ethics, welfare and research committee, or similar entity, with external representation to consider and oversee research activities and foster increased scientific rigour across your operations.
4. Develop a research policy and research protocols to ensure that in all research involving animals, any potential animal welfare concerns are clearly identified and any compromise is minimised, transient and justified in terms of the objectives of the research.
5. Actively work to assist research partners to promote positive animal welfare states.
6. Encourage conservation medicine as a research-based area of activity within your organisation to enhance animal welfare generally and conservation welfare in particular.

INTRODUCTION

Zoos and aquariums offer opportunities for scientists and academic researchers to conduct investigations aimed at increasing understanding of the natural world. Of particular relevance here is research designed to further develop scientifically validated, evidence-based approaches to improve animal welfare and conservation; however, a research focus can and should apply across the spectrum of zoo and aquarium operations.

Research collaborations between zoos or aquariums and academic institutions can have the strong advantage of furthering understanding and knowledge in many areas of zoo and aquarium operations. The sharing of knowledge and expertise can also greatly extend the scope and value of investigations, and may result in investigations being undertaken that would otherwise not be possible.

The 2011 edition of the *International Zoo Yearbook* contains examples of successful partnerships between zoos and aquariums and the academic community, meeting the interests of both groups. Such research has the potential to enrich the lives of study animals (*see case study 7.1*).



Case study 7.1:

Research that enhances animal welfare and provides an innovative visitor experience

The aim of this study at Yorkshire Wildlife Park was to determine whether there were any behavioural differences displayed in Guinea baboons (*Papio papio*) with and without the use of interactive food devices. Three types of devices were available to the baboons, with three of each type bordering the glass wall where visitors were able to view the baboons. Correspondingly, there were three levels of complexity. The simplest required the human to drop the food down a shoot for the baboon to spin a plate and retrieve the food. With the second type, the baboon and human had to sit or stand on a lever platform simultaneously in order for the food to be released. And the final type required the baboon and human to pull on a rope lever synchronously to release the food. Before public interactions occurred, different foods were loaded into the three devices of each type. The results demonstrated that the devices increased the natural foraging behaviour of baboons and increased animal activity, while also providing an innovative visitor experience.

YORKSHIRE WILDLIFE PARK, UK
Guinea baboon

ZOO AND AQUARIUM USE OF ANIMALS IN RESEARCH

Not all research questions are directed at clarifying different facets of animal welfare and its management in zoos and aquariums. However, the welfare impacts of undertaking any research investigation must be evaluated beforehand, especially any negative impacts.

It is important to consider the regulatory context of undertaking scientific investigations on animals, which are legally mandated activities in many countries. The details of laws and regulations may vary but the key principles are often common. The 180 member countries of the World Organisation for Animal Health (OIE) unanimously accepted OIE standards for the 'Use of Animals in Research and Education'. These standards are not intended to supersede existing statutes, which may include more detailed and exacting requirements; rather, they provide guidance to those countries seeking to update old statutes or to introduce them for the first time.

Outlined here are some of the key OIE guiding principles:

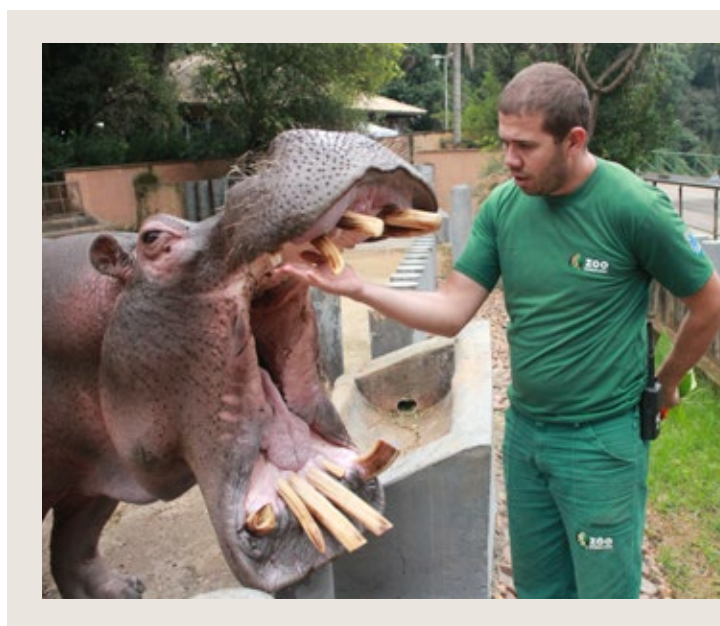
- The scientific use of animals must comply with the requirements of existing national, provincial and/or state laws and related regulations.
- The institutions concerned should have policies and procedures that accord with such statutory requirements, whether or not such statutes are in place, and these policies and procedures should specifically address the scientific use of animals.
- There should be external oversight of animal use in the form of a centralised statutory body, or animal ethics, use and/or care committee, or other such entity that includes some members who are independent of the institution.
- The anticipated benefits of the proposed animal use must be weighed against its anticipated negative welfare impacts, and the balance be towards the benefits for the proposed use to be justified.
- Steps must be taken to minimise any negative welfare impacts.

These principles are a useful guide for zoos and aquariums and their research partners.

Invasive research involving significant surgical interference to an animal is predominantly unacceptable to zoos and aquariums. There are some research projects where such approaches may be acceptable, perhaps involving cases of animals of outstanding conservation value in highly threatened species that are part of an integrated species conservation and management plan and where such research is of immediate benefit to the individual concerned; validation or calibration experiments that benefit an outstanding scientific research or conservation programme in which the institution is engaged or participates; and veterinary medical experiments that use incidental opportunities as and when they arise to test and refine medical treatment and care procedures. Decisions about such research requires careful balancing of management, conservation, scientific and ethical perspectives, and will have the best support if they are taken within the context of a formal consultation and decision framework.

Observational research within a zoo or aquarium setting faces many similar challenges to those of field studies of free-ranging populations. Insufficient sample sizes can be overcome by conducting studies in several zoos or aquariums, using the variation in holding and care conditions as a source of biological variation, or by asking a clear question and conducting a simple experiment in one zoo or aquarium and publishing it as a case study. In combination with simple experimental setups based on positive reward systems, observational studies have a substantial potential to contribute to improvements in animal welfare.

Rapid scientific advances in recent years have created many new techniques to assess animal welfare and 'stress load' (*see case study 7.2*), individual health and reproductive status, paternity and maternity, and the presence of pathogens in a minimally or non-invasive manner. These techniques and theoretical developments advance an evidence-based approach to animal welfare in zoos and aquariums and should be applied.



SOROCABA ZOO, BRAZIL
Hippo

Case study 7.2:

Validating non-invasive techniques to assess animal welfare

Physiological states are increasingly recognised as essential indicators of 'stress' by revealing the 'reactive scope' of organisms to environmental challenges. This is partly because behavioural responses can be an unreliable guide unless evaluated carefully or analysed with sophisticated techniques. Non-invasive methods have revolutionised the assessment of physiological states because they can provide data to answer questions for which traditional invasive techniques are unsuitable. Non-invasive techniques include the measurement of glucocorticoid or catecholamine metabolite levels in urine, faeces, saliva or—most recently—hair, or minimally invasive procedures to obtain blood samples by using blood-sucking bugs. These methods should be validated for each species with appropriate experiments. Zoo and aquarium animals have been used with stellar success to conduct validation experiments across many wildlife species and therefore advanced the study of wildlife welfare substantially. The identification of physiological states is well-recognised as an essential building block in a comprehensive, evidence-based approach to the assessment of animal welfare.

A research focus in zoos and aquariums requires a long-term commitment to closer cooperation with the academic community. A decision-making process on academic partnerships and research at both policy and operational level can be developed to ensure improved animal welfare; encourage high-quality scientific research; facilitate research to answer questions of great relevance to improving animal welfare; and strengthen a zoo's or aquarium's scientific credibility.

FOCUS OF ZOO AND AQUARIUM RESEARCH

Conducting such research in a zoo or aquarium setting is not always straightforward. Sample sizes are small, individuals often have vastly different life experiences, and housing and husbandry conditions vary between exhibits, institutions and over time. However, it is possible to conduct quality scientific research and one strategy for doing so, to maximise the power and wider applicability of findings, is to encompass as many zoos and aquariums as possible. For these reasons, multi-institutional research studies are strongly encouraged. Such research can reveal associations between welfare measures and housing and husbandry that can then be practically applied.

Many aspects of zoo and aquarium management pose research questions of great interest and may result in potential benefit to the zoo and aquarium community. It is apparent that well-established animal welfare knowledge and management practices in non-wildlife species provide a good starting point for investigating their extension to wildlife in zoos and aquariums.

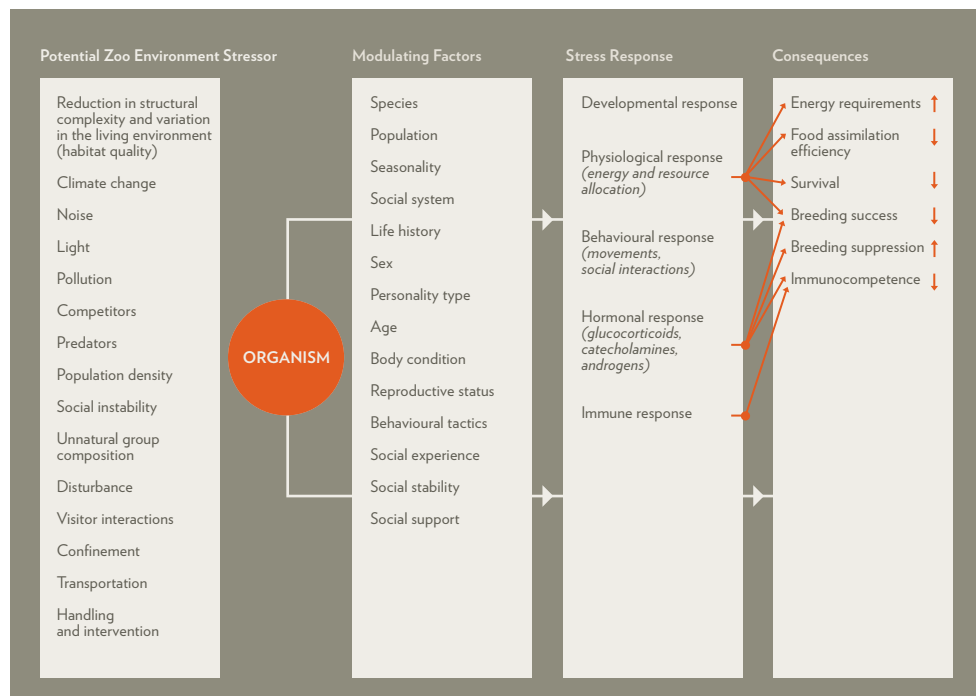
Of the numerous research questions available for study, examples include extending species-specific understanding of indices of negative and positive animal welfare states, including stereotypies and other behaviours; innovative environmental enrichment approaches; detection of infertility; development and application of assisted reproduction techniques; contraceptive control of reproduction; protocols to improve the management of parturition in mammals; optimisation of nutrition; assessment of health status; detection of pathogens, including zoonotic microorganisms; the development of prophylactic protocols in wildlife health; and the facilitation of conservation breeding or reintroduction programmes.

The emphasis on minimising negative welfare impacts has direct relevance to any research undertaken in zoos and aquariums, whether or not that research has a specific animal welfare focus. The Five Domains model (*Chapter 1*), details of which were first published in 1994, was in fact developed specifically to facilitate minimising harm caused by research, teaching and testing procedures applied to sentient animals. In 1997, its use was introduced as a regulatory requirement for all such procedures proposed to be conducted on animals in New Zealand, a requirement that continues to this day. Its wider use for assessing welfare compromise, and the enhancement of welfare, as described above, were later developments.

In terms of animal welfare research, a specific example is a framework for evaluating negative welfare states and their minimisation, which focuses on physiological 'stress' responses and their consequences, as depicted in *Fig. 7.1*.

STUDY OF STRESS

Fig. 7.1. A framework for the study of 'stress' in zoos and aquariums. 'Potential zoo environment stressors' are stimuli whose effects have been demonstrated, but not necessarily within a zoo or aquarium environment. Organisms possess a 'stress response' that has evolved through natural selection exerted by exposure to environment stressors in the past. Empirical evidence shows that species-specific 'modulating factors' may modify the 'stress response'. The 'consequences' are increased energy requirements, and decreased food assimilation efficiency, reproductive activity and success, immunological competence and survival (modified from Hofer & East 2012).



UNDERTAKING RESEARCH IN ZOOS AND AQUARIUMS

The full potential of zoos and aquariums to undertake research to enhance animal welfare and conservation outcomes is currently unfulfilled. Instead of an opportunity, research may be viewed as an additional cost factor or as being in conflict with operational procedures. With careful planning and willingness on all sides, these hurdles can be overcome, as some innovative forms of successful partnerships between zoos and aquariums and academic institutions have demonstrated.

Conservation medicine combines aspects of the routine veterinary care of wildlife, to improve and maintain their health and welfare, with significant elements of health monitoring and research. Zoos and aquariums are excellent locations where veterinary and other biological perspectives on research questions can be fruitfully combined.

Dedicated zoo or aquarium research staff can support management in developing a research policy, proposing research priorities and evaluating proposed research projects regarding their suitability, feasibility, impact on routines and implications for animal welfare. Even without staff specifically dedicated to research, zoo- and aquarium-based research can occur through an organisational culture of research and enquiry and the input of curators and animal keepers to improve management routines and optimise the care and welfare of animals. With a modest amount of structured planning, such approaches can take the form of scientific case studies and be published in accessible peer-reviewed, scientific journals, providing other zoos or aquariums with the opportunity to run similar trials and report on their outcomes.

CONCLUSION

Zoos and aquariums can provide excellent opportunities for high-quality scientific research, with minimal or no compromise to animal welfare. A strategic approach and relatively modest additional efforts can contribute significantly to scientific progress and enhance zoo and aquarium knowledge, performance and also credibility in science-based animal welfare and conservation arenas. This often requires partnerships with the academic community and these can be actively managed for mutual advantage.

Observational studies combined with simple experimental approaches can advance scientific research and improve animal welfare. Recent scientific advances provide theoretical frameworks and practical techniques to comprehensively assess animal welfare, including the animals' health, in minimally or non-invasive ways. Zoos and aquariums have the potential to advance an evidence-based approach to their operations and to animal welfare, if they decide to employ these approaches.

CHECKLIST

- Do you consider recent scientific findings when reviewing your animal welfare policies and procedures?
- Do you have a list of research priorities for your organisation?
- Does it include questions on animal welfare and ensure good animal welfare is incorporated?
- Do you encourage your staff members to conduct and publish case studies that could support an evidence-based approach to animal welfare?
- Are your animals in research projects subject to the same level of welfare scrutiny as other animals in your organisation?
- Do you have an animal ethics, welfare and/or research committee, or equivalent entity? If so, does it have external members?
- Is the committee consulted on proposed research activities at your organisation?
- Is the approval of research projects subject to the procedures of a harm-benefit analysis and the minimisation of the potential negative impacts of the use of study techniques?
- Do your research partners require support to ensure that during their research they manage animal welfare appropriately?
- Are you aware of any relevant legislation that may apply to your research? Have you sought appropriate permissions?
- Do your staff members understand the purposes of research, your animal welfare guidelines for researchers and the expected outcomes in terms of research results?

NOTES:



RED-CROWNED CRANES
JAPAN



PARTNER

Our commitment is to work collaboratively and openly to highlight animal welfare and improve the lives of animals.

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Become a recognised centre for animal welfare expertise and assist and advise other organisations on animal welfare.
2. Make sure that all relevant staff, including your animal management and veterinary staff members, closely collaborate and are up to date with professional standards of animal health and welfare.
3. Collaborate and partner with universities, research bodies and other zoological institutions to further understanding of animal welfare states and animal sentience.
4. Partner with animal welfare organisations and external animal welfare experts, through representation on animal ethics and welfare committees, or similar entities, in reviewing animal welfare in your organisation.
5. Partner or 'twin' with zoological institutions that require guidance to achieve positive welfare outcomes for the animals in their care. This can be through staff exchanges, training opportunities, exchange of procedures or funding grants.

INTRODUCTION

As in any endeavour, partnerships mean that capacity is shared and increased. This is also the case for animal welfare work in zoos and aquariums. This Strategy as a whole reflects the complexity underlying the proper care of animals in zoos and aquariums and the many matters that need to be considered to meet species-specific needs. A wide range of inputs is required, so that the establishment of partnerships that together provide all the skills is beneficial.

The formation of effective relationships with collaborating colleagues is important to encourage and achieve long-term advances in animal welfare. Key to the development of effective and successful partnerships is trust, understanding, and clear and effective communication.

Partnering is a core activity and requirement for modern zoo and aquariums. The *World Zoo and Aquarium Conservation Strategy* (2005) devoted a chapter to the concept of partnerships, emphasising that as zoos and aquariums embrace a unique mix of technical and interpretive expertise, legal and environmental ethics and knowledge of biodiversity, they should cooperate among themselves to provide mutual support. Although the *World Zoo and*

Aquarium Conservation Strategy focuses primarily on biodiversity conservation, the delivery of high standards of animal welfare also benefits from this. Modern zoos and aquariums therefore seek to ensure that the development of partnerships to support their conservation and animal welfare objectives is a core competency.

PARTNERING TO EXPAND CAPACITY AND KNOWLEDGE

Partnerships in animal welfare can have a variety of objectives and functions. Research collaborations with universities can significantly contribute to our understanding and effectiveness in managing animal welfare. Also, zoo or aquarium veterinary clinics can partner with conservation bodies working in the field to focus on the health and welfare of free-ranging wildlife. Such partnerships should enable us to increase specific projects that enhance our knowledge; for example, pain perception, sentience and different behavioural expressions of positive affective states in the variety of species accommodated in zoos and aquariums, invertebrates as well as vertebrates.

Advancing understanding in such areas would further develop animal welfare principles and facilitate improvements in the husbandry provisions required to ensure good welfare of wildlife in human care. Of particular significance in the animal welfare context are the benefits provided by zoos and aquariums establishing and maintaining animal ethics and welfare committees, or similar entities, which include external (non-staff) membership. Consideration should be given to the inclusion of representatives of animal welfare groups, if their members are prepared to participate constructively in the functions of such committees.

For partnerships to be successful, zoos and aquariums require a high level of transparency in their operations, particularly regarding animal welfare standards. Persistent high-level scrutiny exists, not only by the visiting public but also by governmental and non-governmental animal welfare bodies and by animal rights groups. These are audiences with strong interests in those zoo and aquarium activities that potentially affect animal welfare. Transparency helps allay the concerns they may have and, in addition, animal ethics and welfare committees and animal welfare charters provide good vehicles for demonstrating accountability.

ANIMAL WELFARE ORGANISATIONS

Modern zoos and aquariums can benefit by being proactive in their dealings with local and international animal welfare organisations and by actively building positive relationships with them (see case study 8.1). While the notion of involving members of local animal welfare organisation in an animal ethics and welfare committee might seem to be risky to some zoo and aquarium managers, international experience shows that most animal welfare organisations welcome such involvement and are usually an asset to such committees.

The remit and focus of animal welfare organisations varies widely and while some may consistently challenge the keeping of wildlife species in human care, many others are practically and scientifically minded organisations that welcome collaboration. The openness of cooperative arrangements, in ensuring that the participants are well informed, helps to forestall confrontational misunderstandings that may otherwise occur. However, as the ethos of such organisations in some localities may preclude constructive partnering, this should be given careful consideration.

Similarly, soliciting the involvement of animal welfare organisations in the development of animal welfare charters is a useful mechanism to build trust between representatives of both communities. This, in terms of improving animal welfare, is advantageous.

Although differences of opinion about what constitutes good animal welfare may persist between such partners, they are often mitigated by recognition of a common purpose. Even when an organisation might seem to be opposed to zoos and aquariums and be publicly vocal about that, these groups regularly seek local help from their accredited zoo or aquarium to deal with an individual wildlife problem or a substandard zoo or aquarium. Such interactions help to cement valuable working relationships for going forward.

An advantage of such partnerships—quite apart from combining networks, effort, skills and resources—is that their existence and operational transparency tend to be reassuring to the wider public who are thereby less influenced by the opposition of groups that will remain implacably opposed to zoos and aquariums.

ANIMAL RIGHTS ORGANISATIONS

Unfortunately, many proponents of ‘animal rights’ work around the doctrine of freedom and ‘liberation’, which in its application opposes the concepts under which zoos and aquariums operate. The consequence is that there is rarely a middle ground that enables constructive dialogue. As in the instance of any clash of fundamental philosophies, non-participation in the debate to begin with is sometimes the only effective strategy.

However, as with animal welfare organisations, there is a spectrum of operational values within animal rights communities and, depending on the circumstances and the individuals concerned, accords may be reached. Much can be achieved going forward with a sensible dialogue that recognises differences and accepts them.

WORKING WITH COLLEAGUE ZOOS AND AQUARIUMS

As a professional ethical practice, the pursuit and application of good animal welfare cannot end at our own zoo or aquarium gates. It should be projected outwards to other organisations that need help.



Case study 8.1:

Partnering with an international animal welfare organisation

At the request of the World Society for the Protection of Animals (WSPA; renamed World Animal Protection in 2014), personnel from both WSPA and WAZA teamed up to visit three bear parks in Asia in 2004. The team found that in all three parks the conditions in which the bears were kept were well below even basic standards expected of responsible zoos holding these species. The team developed a comprehensive report that detailed specific recommendations to upgrade the conditions for the bears at these parks. Follow-up visits by team members took place in 2007 and, although some improvements were noted, it was clear that long-term external monitoring would be required to bring about significant change in the bears’ circumstances. Consequently, Wild Welfare, through the support of zoological institutions and international animal welfare organisations, has re-visited the parks and is evaluating the next steps to take that will make improvements. This project represents an excellent example of a partnership with an international animal welfare organisation where zoo and aquarium expertise was needed to identify and evaluate issues of poor animal welfare provision within the international zoo and aquarium community.

ASIAN BEAR PARK
Brown bears

Recent surveys have shown that as many as eight out of ten institutions keeping wildlife species (or ‘zoos’ and ‘aquariums’) open to the public worldwide operate with no animal welfare accreditation standards. Many of these organisations have facilities in very poor condition and animal welfare is a serious concern. Such situations adversely impact public perception of all zoos and aquariums—good and bad. Modern zoos and aquariums are strongly encouraged to assist in efforts to improve conditions in these zoological institutions, because ‘zoo’ or ‘aquarium’ people, wherever they are, will tend to listen more seriously to other zoo or aquarium people and then take the necessary action to improve.

When dealing with such situations, it is critical to determine who makes the decisions that will address poor animal welfare. Who is really in charge? Frequently, it is not in the zoo or aquarium itself and many factors may be at play. Local politics often enter into the picture and occasionally poor management or animal welfare may be the result of other factors.

Ways to assist include ‘twinning’ partnerships between a modern zoo or aquarium (or consortia of zoos and aquariums) and the facility in need of assistance. Similarly, partnerships with animal welfare organisations provide sound prospects for cooperation, as they bring a variety of skills, resources and networks of their own (see case study 8.2).



Case study 8.2:

An example of partnership in action

Following the long civil war and finally the capture of Kabul in 2001, Kabul Zoo was largely in ruins. North Carolina Zoo raised US\$ 500,000 from 6,000 largely private subscribers to support and help rebuild it. The emergency first phase, the provision of food, water and heating to the animals during the first few weeks, was undertaken by staff members from the World Society for the Protection of Animals (WSPA; renamed World Animal Protection in 2014), which had a team ready to act quickly for such emergencies. The second, stabilisation phase was undertaken by zoo- and aquarium-based personnel from all over the world, recruited by North Carolina Zoo. The final stage of training and capacity building was then accomplished largely through the Indian zoo community. Other zoo and aquarium personnel notably from the Wildlife Conservation Society, with added funding from the European Union and others, have since provided further assistance.

KABUL ZOO, AFGHANISTAN
Animal habitat

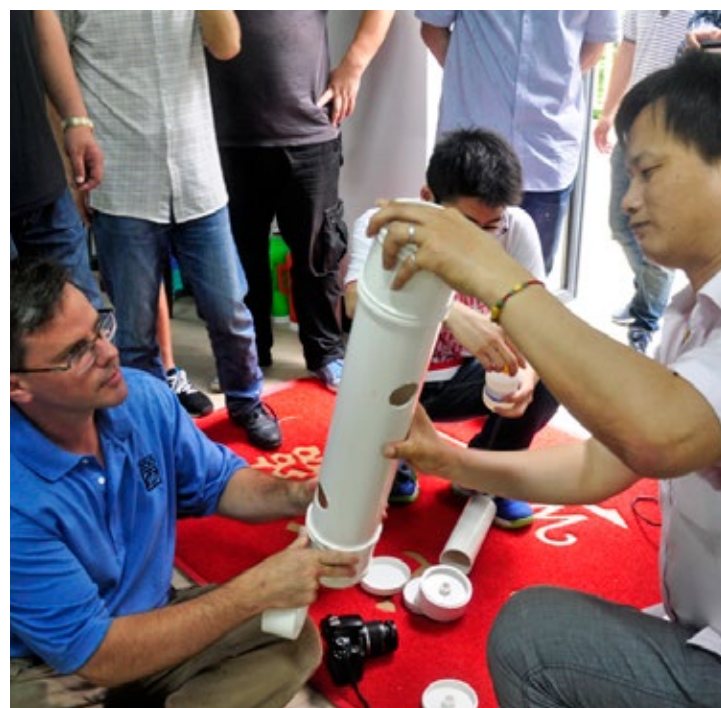
From a practical, financial and marketing perspective, it is relatively easy to be immediately and visibly effective in assisting a zoo or aquarium in need through the simple expedient of staff exchanges and training. There are great benefits in a staff exchange. As many zoos and aquariums in need may be involved in trading animals from the wild, assisting such zoological institutions and helping to stop such trade may have an additional conservation value. For further guidance in this area, refer to the *WAZA Code of Ethics and Animal Welfare* (see appendix).

CONCLUSION

To achieve the necessary high standards of animal welfare globally, it is imperative that zoos and aquariums embrace animal welfare responsibly by promoting effective communication with colleagues and by establishing, nurturing and maintaining proactive partner relationships, while at the same time being open about efforts to improve the lives of wildlife species in human care.

Importantly, zoos and aquariums that are in need of assistance can benefit from the establishment of successful partnerships that facilitate the sharing and effective use of collective knowledge and expertise. Such help may ultimately aid improvements in animal welfare and operational standards, and encourage long-term organisational change in attitudes towards animal welfare.

Moreover, not only can partnerships offer support to colleagues and benefit the lives of individual animals by improving their welfare, but by working together and striving to find practical solutions to animal welfare challenges through knowledge sharing and the pooling of resources, these partnerships can highlight the importance of, and dedication to, animal welfare within the zoo and aquarium community and positively influence public perception.



HOUSTON ZOO, TX, USA AND HANGZHOU ZOO, HANGZHOU, CHINA
Houston Zoo staff training Hangzhou Zoo staff how to utilise PVC for environmental enrichment.

CHECKLIST

- Do all your partnerships support the promotion of high animal welfare standards?
- Do you work effectively with animal welfare organisations? Are there ways you could work more effectively?
- Are there opportunities for your zoo or aquarium to work with colleague organisations in need of assistance to improve their animal welfare standards?
- Do your professional staff members, such as veterinarians, researchers, curators and animal keepers, provide advice to people outside your organisation on animal health and welfare? Could they do more?
- Do you promote your organisation as supporting high standards of animal welfare?
- Do you measure community perceptions of your animal welfare performance?

NOTES:



Cassowary



ECHIDNA
PERTH ZOO, AUSTRALIA



ENGAGE

Our commitment is to protect and enhance the welfare of our animals in all of their interactions with visitors while we engage visitors in wildlife conservation.

RECOMMENDATIONS

To realise our commitment to high animal welfare standards, the *World Zoo and Aquarium Animal Welfare Strategy* calls on member organisations to:

1. Avoid using animals in any interactive experiences when their welfare may be compromised.
2. Undertake specific animal welfare evaluations and ongoing monitoring of all individual animals being used in interactive experiences. Withdraw animals from such activities if behavioural and other indices of distress are elevated.
3. Ensure that the messaging that accompanies all interactive experiences and the intent of any related presentations is to raise conservation awareness and/or achieve conservation outcomes.
4. Do not undertake, contribute or participate in animal shows, displays or interactive experiences where animals perform unnatural behaviours. Species conservation should be the overriding message and/or purpose.
5. Set in place processes to ensure that all animals in your zoo or aquarium are treated with respect. This includes how animals are depicted and presented.
6. Explain, via talks, signage and/or interpretation, how animal welfare improvements have been made in your organisation.
7. Access and use the body of knowledge and expertise that underlies the evaluation of the effectiveness of environmental education when considering developing interactive experiences to ensure that benefits are realised.

INTRODUCTION

Zoos and aquariums have seen a rapid growth in interactive experiences in recent years, taking advantage of a general affinity between humans and animals to encourage visitors to act to conserve wildlife. The progression from simply exhibiting zoo and aquarium animals for visitors to observe, which was common in the past, to present approaches that bring humans and animals into close proximity, has gained momentum because it engages visitors more effectively and thereby provides better opportunities to educate them about animals, and conservation of wildlife.

Interactive experiences vary between organisations. They may be minimal with visitors having access to a behind-the-scenes area. There are also situations where people are brought into the animals' exhibits and other situations where animals and humans may have hands-on contact.

All interactive experiences should be assessed for their impact on the welfare of the animals by: applying ongoing welfare assessment and monitoring; referring to the frequency, duration and timing (time of day) of the interactions; noting whether actual physical contact is necessary and, if so, with how many visitors; noting visitor characteristics; and evaluating how consistently the interactive experience is provided.

As with these animal-focused assessments, the impacts of differences in housing and husbandry need to be carefully evaluated, especially if they differ for animals used interactively compared to others in the zoo or aquarium. The possible impact on other members of a social group or exhibit companions should also be evaluated, if group members are periodically removed for interactive experiences. Any animal used in an interactive experience should have the same opportunities for positive welfare outcomes as other animals held within the zoo or aquarium that are not involved.

Where possible, zoos and aquariums should also explain the animal welfare and management processes to visitors, to build understanding of and respect for animals and the natural world (*see case study 9.1*). This can be done through talks, an animal welfare charter, signage and/or environmental education programmes.

The increasing use of interactive experiences in zoos and aquariums has largely been informed by the expectation that close proximity between humans and animals, and where possible 'actual contact', can increase the likelihood, scope and impact of environmental education and commitment to conservation actions. However, research on this proposition has not yet produced definitive results.

Nevertheless, as more zoos and aquariums adopt the intuitively attractive principle of 'connect, understand, act', there will be increasing opportunities to rigorously evaluate the effects of different approaches towards environmental education, and also to consider carefully the welfare of animals in these programmes. Importantly, there is evidence that some animals find some interactive experiences unpleasant and stressful. More research is required to directly evaluate the impacts of such experiences, and it is the responsibility of the zoos and aquariums providing these interactions to ensure that this work is undertaken.

Organisations using animals in any interaction or show should always evaluate the impact and risks of such experiences on the welfare states of the individual animals and carefully monitor welfare impacts. Consideration of the animal's welfare should remain a priority.

Many zoos and aquariums, and the European Association of Zoos and Aquaria (EAZA), have developed guidelines for the use of animals in interactive or public demonstrations. These are useful guides for individual zoos and aquariums considering or undertaking interactive experiences or shows.



Case study 9.1:

Stereotypes and the visitor experience

Recent evidence suggests that visitors are interested in viewing animals that are engaged in species-appropriate behaviour. Specifically, visitors who were shown a short five-second video clip of a tiger (*Panthera tigris*) pacing reported that they thought the animal received lower levels of animal care than did someone watching the same-length video of a tiger resting. Additionally, the visitors watching the video of the tiger pacing were less likely to support zoos and aquariums through visitation or donations. Given the importance of animal welfare and encouraging visitors to support conservation action, it is important for zoos and aquariums to focus on eliminating or reducing such behaviours. In addition to improving animal welfare, this is to ensure that visitors have a positive experience, which may then translate into pro-conservation behaviour.

ZOOS VICTORIA, AUSTRALIA
Tigers

WHAT IMPACT DO VISITORS AND VISITOR INTERACTIONS HAVE ON WELFARE?

The nature of interactive experiences varies widely, as do the taxa involved. Our knowledge of their impacts on the animals is still very limited (*see case study 9.2*). To date, research has emphasised primates and carnivores and has focused more on the effects of human presence rather than the interactive events. Some research indicates that the daily arrival of visitors may be disturbing and can be a source of distress for animals. This may manifest as increases in anxiety-related behaviours and within-group aggression, and decreases in social behaviours towards other group members. Also, the animals may exhibit threatening behaviours towards visitors and the corticosteroid levels in faeces, urine or saliva may be elevated, suggesting that the animals may be stressed.

Alternatively, other animals may show no obvious signs of stress when exposed to visitors. It is likely that individual responses will vary because of past experience and differences in exhibit design, environmental enrichment and relationships with animal keepers. Equally, some species do not naturally show any outward signs of stress, or may have behavioural stress responses that can be commonly misinterpreted by humans. In order to minimise distress, provision should be made for animals to retreat from public view. Alternatively, some kind of physical or psychological barrier, such as screening at windows or solid barriers with small viewing windows, should be provided.

Many zoos use domestic animals such as sheep, goats and pigs for interactive animal experiences, with no ill effects on most of these animals. However, some animals in petting zoos and contact yards may display undesirable behaviours towards visitors, a problem solved by simply withdrawing those animals. As with animals in 'traditional exhibits', animals in 'contact areas' should be able to remove themselves (retreat) from human contact, but still access, for example, food, water and areas for resting and thermal comfort.

In situations when visitors are taken into exhibits, for example involving relocation of animals within the zoo or aquarium, bird shows, interactive shows with big cats and animal feeding by visitors, it is unclear whether the welfare impacts are good, neutral or poor. Given this uncertainty, it is important that zoos and aquariums carefully monitor such events and withdraw animals if there are indications of welfare being compromised. Also, animals should be carefully selected for their suitability for such events on the basis of their natural history and individual characteristics, as assessed by experienced staff members who are familiar with each animal.

If animal interactions take place, they should be done in an environment where the animal is free to leave the interaction whenever it chooses. An experienced animal keeper who has a clear understanding of the individual animal's needs should undertake all interactions, and as with all close encounters, both in public and behind the scenes, positive reinforcement training should be used to create a positive and stimulating environment.

Close contact between visitors and animals in zoos and aquariums can also carry health risks for both, including infectious diseases. Reducing these risks, for example with hand hygiene stations and a transition area between animal and non-animal



HOUSTON ZOO, TX, USA
Western lowland gorilla

areas, is vital. Risks of injury must also be appropriately managed. It is essential for event-specific health and safety standards to be developed and applied.

MONITORING IMPACTS OF INTERACTIVE EXPERIENCES

It is recognised that zoos and aquariums should base decisions about whether they should provide interactive experiences on evidence about the individual animals and the need to provide conditions that encourage positive animal welfare states.

There is a difference between public and staff animal interactive experiences. The former should always be carefully evaluated (see below), while the latter, if carried out appropriately, can be part of a stimulating and positively reinforced training programme that contributes towards positive welfare. The two interactions must be reviewed separately when considering the justification for such activities.

Given the risks involved and the dearth of research in this area, it is recommended that an animal ethics and welfare committee, or equivalent entity, evaluates whether interactive experiences are appropriate. In some regions, there is a legal obligation for organisations to establish such committees, the membership of which may include qualified professionals, community members and advocates from other conservation and animal welfare non-governmental organisations.

Monitoring of all interactive experiences is essential to increase our understanding of their impacts and ensure high levels of animal welfare. This requires a good understanding of animal welfare science. Thus, it is strongly recommended that ongoing monitoring of animals be coupled with staff training at all levels of the organisation.

Case study 9.2:

Visitor influence on gorillas

Probably the most promising way of interpreting how visitors affect animals is to compare the responses of different individuals within the same species under a range of different housing and husbandry conditions. Gorillas (*Gorilla gorilla*), for example, have now been studied at a number of zoos. At six of these zoos, gorillas showed what appeared to be a negative response (e.g. more aggression, undesirable behaviours or visual scanning), while at two zoos they showed a mildly positive response (less undesirable behaviours or seeking proximity to the visitors) and at those remaining they showed no apparent effect. How can we interpret this? It is likely that differences in housing, husbandry, previous experience and animal personality are important. And what can be done about visitor influence? Visual barriers at Belfast Zoo, for example, led to less aggression and stereotypies in the gorillas. At one zoo gorillas were less aggressive and interacted less with visitors when staff members spent more time with them, but at another they showed more aggression. Individual differences in gorillas, and many others species, are likely to be important in understanding these patterns of visitor influence.

Where practices for managing some zoo and aquarium animals deviate from those applied to other animals, they should be carefully monitored to clarify any untoward long-term impacts on behaviour and welfare. For example, it is well established that imprinting on humans can adversely affect animals. Thus, species prone to imprinting should not be hand-reared for the purpose of interactive experiences.

Finally, interactive experiences should accommodate the animals' natural history and behavioural repertoire; should not require great effort on the part of zoo or aquarium staff members to engage the animal in taking part; should represent to visitors our respect for the animal; and should have overriding conservation messages consistent with the purpose of modern zoos and aquariums.

CONCLUSION

Many zoos and aquariums use interactive experiences to support various conservation, research and education goals. Ensuring that these interactive experiences are provided in a manner that prioritises good animal welfare requires the adoption of evidence-based animal management practices and should be informed by systematic and objective animal welfare research.

Interactive experiences should be non-invasive, safe and non-stressful for animals. Monitoring of all animals involved in interactions must be ongoing and have professional oversight. Risks to animal welfare should be minimised by carefully considering whether interactive experiences are appropriate, and if they are, by accommodating the animals' particular needs.

CHECKLIST

- Have your interactive experiences been assessed as suitable for the species being used? What criteria have been used for this assessment?
- Do you have a process in place for assessing new interactive experiences prior to their implementation to ensure that animal welfare standards are met?
- Is the assessment process based on species-specific knowledge and up-to-date research?
- Have all safety and health matters been addressed, including the possibility of zoonotic and airborne diseases (e.g. in primates)?
- Is there an ongoing review process to ensure that animal welfare issues do not arise over time for the animals being used?
- Is the health of the animals used regularly being monitored?
- Are your staff members skilled at detecting changes in the health and demeanour of the animals being used?
- What would happen to animals if they were withdrawn from interactive experiences? Can you continue to provide quality care for them?
- Do your presentations or experiences involving animals have informed conservation messages, contain educational and science-based information and demonstrate respect for the animals?

NOTES:



Grant's zebra

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Puerto Rican crested toad

ACRONYMS AND WEBSITES

AZA

[Association of Zoos and Aquariums](#)

CPM

[WAZA Committee for Population Management](#)

EAZA

[European Association of Zoos and Aquaria](#)

GSMP

[Global Species Management Plan](#)

ISIS

[International Species Information System](#)

IUCN

[International Union for Conservation of Nature](#)

OIE

[World Organisation for Animal Health](#)

WAZA

[World Association of Zoos and Aquariums](#)

ZAA

[Zoo and Aquarium Association Australasia](#)

ZIMS

[Zoological Information Management System](#)

GLOSSARY OF TERMS

The definitions provided here are determined by the context within this Strategy. These definitions aim to provide clarity and confidence about the meanings within this document.

Acceptable

Acceptable in terms of international norms within the parameters of the document's context.

Adequate

Sufficient and suitable for the intended purpose; should result in positive rather than negative outcomes.

Animal welfare

How an animal copes with the conditions in which it lives. A good state of welfare (as indicated by scientific evidence) results in an animal that is healthy, comfortable, well-nourished, safe, able to express innate behaviour and not suffering from unpleasant states, such as pain, fear and distress.

Animal welfare compromise

A negative overall state of welfare or when a specific attribute of welfare is negative.

Aquarium

Permanently sited facility, primarily open to and administered for the visiting public, with living wildlife and other species.

Behavioural enrichment

The various means by which the behavioural repertoires of animals in human care can be managed and enhanced to improve well-being.

Captivity (from a zoological perspective)

A situation where an animal is maintained in a man-made habitat and solely or partially dependent on human care.

Collection planning

Strategic planning process at an institutional, regional or global level, to identify and prioritise taxa suitable for human intervention and care, determined by the conservation and educational value of that taxa, and an ability to provide adequate care; collection planning envisions the future of the institution, and takes into account organisational resources and limitations.

Competent

A capacity to undertake designated duties effectively.

Conservation

Securing populations of species in natural habitats for the long term (WAZA definition).

Conservation outcomes

Quantitative, qualitative and otherwise demonstrable conservation results at the species and/or habitat level, either in human care or in the wild.

Conservation welfare

Ensuring positive animal-welfare states at the same time as aiming to achieve conservation objectives, such as wildlife-research activities or release-to-the wild programmes.

Enrichment

The act of enriching or the state of being enriched.

Environmental enrichment

The design and management of the environments of animals in human care to promote positive welfare states.

Euthanasia

The humane, painless and distress-free termination of life, using a method that produces concurrent loss of consciousness and central nervous system functioning.

Justifiable

Supportable by convincing argument.

Management authority

Senior personnel within the facility responsible for day-to-day management and administration.

Modern zoo or aquarium

Contemporary zoo or aquarium (as defined within this glossary) that strives to achieve high standards of wildlife conservation, animal welfare and environmental education.

Natural behaviour

The individual behaviours, or the repertoire of different behaviours, that exhibit species-specific survival value and which reflect the ecological niche in which the animal species evolved.

Normal behaviour

A behaviour that occurs at a frequency, duration and intensity within the range expressed by free-living conspecifics.

Sanctuary

A permanently sited facility exclusively administered for on-site, long-term or lifelong individual animal care. A sanctuary is a facility that provides appropriate care for rescued animals that have suffered abuse, injury or have been abandoned.

Sentience

Is the capacity to have subjective experiences and feel and perceive emotions such as pain and pleasure. It implies a level of conscious awareness and an ability to suffer.

Staff interactive experience

A pre-planned activity that enables qualified staff only to come into close contact (usually but not limited to tactile interactions) with wildlife or domestic species in their care.

Suffering

Adverse mental states that negatively affect the welfare status of an animal and are associated with experiences such as extremes of thirst, hunger, pain, anxiety, fear, loneliness, depression and boredom.

Veterinarian

A person legally registered as a veterinarian with an appropriate legislative body accepted by the country within which the institution is located.

Visitor interactive experience

A pre-planned activity that enables the visiting public to come into close contact (usually but not limited to tactile interactions) with wildlife or domestic species in the care of the zoo or aquarium.

Well-being

A state of harmony between the animal's physical and psychological functioning; synonymous with a good welfare state.

Whole-of-life care

Care of an individual animal aimed at securing an acceptable quality of life throughout its lifespan by considerate, knowledgeable and skilful zoo and aquarium management, including, if required, inter-institutional transfer.

Wildlife

A species of animal not domesticated (as widely understood) and that retains its wild traits.

Wildlife farming

Any commercial facility or operation that holds wild-caught or human-bred wildlife species to sell them while alive, to keep them alive to harvest saleable biological products or, after death or slaughter, to sell their body parts.

Zoo

Permanently sited facility, primarily open to and administered for the visiting public, with living wildlife and other species.

PREAMBLE

The continued existence of zoological parks and aquariums depends upon recognition that our profession is based on respect for the dignity of the animals in our care, the people we serve and other members of the international zoo and aquarium profession. Acceptance of the *World Zoo and Aquarium Conservation Strategy* is implicit in involvement in WAZA.

Whilst recognising that each region may have formulated its own code of ethics, and a code of animal welfare, WAZA will strive to develop an ethical tradition that is strong and which will form the basis of a standard of conduct for our profession. Members will deal with each other to the highest standard of ethical conduct.

Basic principles for the guidance of all members of WAZA:

- Assisting in achieving the conservation and survival of species must be the aim of all members of the profession. Any actions taken in relation to an individual animal (e.g. euthanasia or contraception) must be undertaken with this higher ideal of species survival in mind, but the welfare of the individual animal should not be compromised.
- Promote the interests of wildlife conservation, biodiversity and animal welfare to colleagues and to society at large.
- Cooperate with the wider conservation community, including wildlife agencies, conservation organisations and research institutions, to assist in maintaining global biodiversity.
- Cooperate with governments and other appropriate bodies to improve standards of animal welfare and ensure the welfare of all animals in our care.
- Encourage research and dissemination of achievements and results in appropriate publications and forums.
- Deal fairly with members in the dissemination of professional information and advice.
- Promote public education programmes and cultural recreational activities of zoos and aquariums.
- Work progressively towards achieving all professional guidelines established by WAZA.

At all times, members will act in accordance with all local, national and international law and will strive for the highest standards of operation in all areas including the following:

1. ANIMAL WELFARE

Whilst recognising the variation in culture and customs within which WAZA operates, it is incumbent upon all members to exercise the highest standards of animal welfare and to encourage these standards in others. Training staff to the highest level possible represents one method of ensuring this aim.

Members of WAZA will ensure that all animals in their care are treated with the utmost care and their welfare should be paramount all times. At all times, any legislated codes for animal welfare should be regarded as minimum standards. Appropriate animal husbandry practices must be in place and sound veterinary care available. When an animal has no reasonable quality of life, it should be euthanised quickly and without suffering.

2. USE OF ZOO- AND AQUARIUM-BASED ANIMALS

Where 'wild' animals are used in presentations, these presentations must:

- deliver a sound conservation message or be of other educational value,
- focus on natural behaviour,
- not demean or trivialise the animal in any way.

If there is any indication that the welfare of the animal is being compromised, the presentation should be brought to a conclusion.

When not being used for presentations, the 'off-limit' areas must allow the animal sufficient space to express natural behaviour and should contain adequate items for behavioural enrichment.

While the code focuses on zoo- and aquarium-based 'wild' animals, the welfare of domestic animals (sheep, goats, horses, etc.) in, for example, petting zoos should not be compromised.

3. EXHIBIT STANDARDS

All exhibits must be of such size and volume as to allow the animal to express its natural behaviours. Enclosures must contain sufficient material to allow behavioural enrichment and allow the animal to express natural behaviours. The animals should have areas to which they may retreat and separate facilities should be available to allow separation of animals where necessary (e.g. cubbing dens). At all times, animals should be protected from conditions detrimental to their well-being and the appropriate husbandry standards adhered to.

4. ACQUISITION OF ANIMALS

All members will endeavour to ensure that the source of animals is confined to those born in human care and this will be best achieved by direct zoo-to-zoo conduct. The advice of the appropriate species coordinator should be sought before acquiring animals. This will not preclude the receipt of animals resulting from confiscation or rescues. It is recognised that, from time to time, there is a legitimate need for conservation breeding programmes, education programmes or basic biological studies, to obtain animals from the wild. Members must be confident that such acquisitions will not have a deleterious effect upon the wild population.

5. TRANSFER OF ANIMALS

Members will ensure institutions receiving animals have appropriate facilities to hold the animals and skilled staff who are capable of maintaining the same high standard of husbandry and welfare as required of WAZA members. All animals being transferred will be accompanied by appropriate records, with details of health, diet, reproductive and genetic status and behavioural characteristics having been disclosed at the commencement of negotiations. These records will allow the receiving institution to make appropriate decisions regarding the future management of the animal. All animal transfers should conform to the international standards and laws applying to the particular species. Where appropriate, animals should be accompanied by qualified staff.

6. CONTRACEPTION

Contraception may be used wherever there is a need for reasons of population management. The possible side effects of both surgical and chemical contraception, as well as the negative impact on behaviour, should be considered before the final decision to implement contraception is made.

7. EUTHANASIA

When all options have been investigated and the decision is taken that it is necessary to euthanise an animal, care will be taken to ensure it is carried out in a manner that ensures a quick death without suffering. Euthanasia may be controlled by local customs and laws but should always be used in preference to keeping an animal alive under conditions that do not allow it to experience an appropriate quality of life. Whenever possible, a post-mortem examination should be performed and biological material preserved for research and gene conservation.

8. MUTILATION

Mutilation of any animal for cosmetic purpose, or to change the physical appearance of the animal, is not acceptable. Pinioning of birds for educational or management purposes should only be undertaken when no other form of restraint is feasible and marking animals for identification should always be carried out under professional supervision, in a way that minimises suffering.

9. RESEARCH USING ZOO- AND AQUARIUM-BASED ANIMALS

All zoos and aquariums should be actively involved in appropriate research and other scientific activities regarding their animals and distribute the results to colleagues. Appropriate areas of research include exhibit design, observations, welfare, behaviour, management practices, nutrition, animal husbandry, veterinary procedures and technology, assisted breeding techniques, biological conservation and cryopreservation of eggs and sperm. Each zoo or aquarium undertaking such research should have a properly constituted research committee and should have all procedures approved by a properly constituted ethics committee.

Invasive procedures designed to assist in medical research are not to be performed on zoo or aquarium animals; however, the opportunistic collection of tissues during routine procedures and collection of material from cadavers will, in most cases, be appropriate.

The well-being of the individual animal and the preservation of the species and biological diversity should be paramount and uppermost in mind when deciding upon the appropriateness of research to be undertaken.

10. RELEASE-TO-THE-WILD PROGRAMMES

All release-to-the wild programmes must be conducted in accordance with the IUCN SSC Reintroduction Specialist Group guidelines for reintroduction.

No release-to-the-wild programme shall be undertaken without the animals having undergone a thorough veterinary examination to assess their fitness for such release and that their welfare post-release is reasonably safeguarded. Following release, a thorough monitoring programme should be established and maintained.

11. DEATHS OF ANIMALS WHILST IN CARE

Unless there are sound reasons not to do so, each animal that dies in captivity, or during a release-to-the-wild programme, should undergo post-mortem examination and have a cause of death ascertained.

12. EXTERNAL WILD ANIMAL WELFARE ISSUES

While this code of practice is designed for animals held within zoos, aquariums, wildlife parks, sanctuaries, etc., WAZA abhors and condemns ill-treatment and cruelty to any animals and should have an opinion on welfare issues for wild animals external to its membership.

WAZA REQUIRES THAT:

- The taking of animals and other natural resources from the wild must be sustainable and in compliance with national and international law and conform with the appropriate IUCN policy.
- Any international trade in wild animals and animal products must be in compliance with CITES and the national legislation of the countries involved.

WAZA OPPOSES:

- Illegal and unsustainable taking of animals and other natural resources from the wild; for example, for bush meat, corals, fur or skin, traditional medicine, timber production.
- Illegal trade in wild animals and wild animal products.
- Cruel and non-selective methods of taking animals from the wild.
- Collecting for or stocking of animal exhibits, in particular aquariums, with the expectation of high mortality.
- The use or supply of animals for 'canned hunting'; that is, shooting animals in confined spaces, or when semi-tranquilised or restrained.
- Keeping and transporting of animals under inadequate conditions; for example, the keeping of bears in confinement for extraction of bile, dancing bears, roadside zoos or circuses/entertainment.

WAZA and its members should make all efforts in their power to encourage sub-standard zoos and aquariums to improve and reach appropriate standards. If it is clear that the funding or the will to improve is not there, WAZA would support the closure of such zoos and aquariums.

This document was prepared on the basis of the 1999 Code of Ethics and the 2002 Code of Animal Welfare. It was adopted at the Closed Administrative Session of the 58th Annual Meeting, held on 19 November 2003 at San José, Costa Rica.

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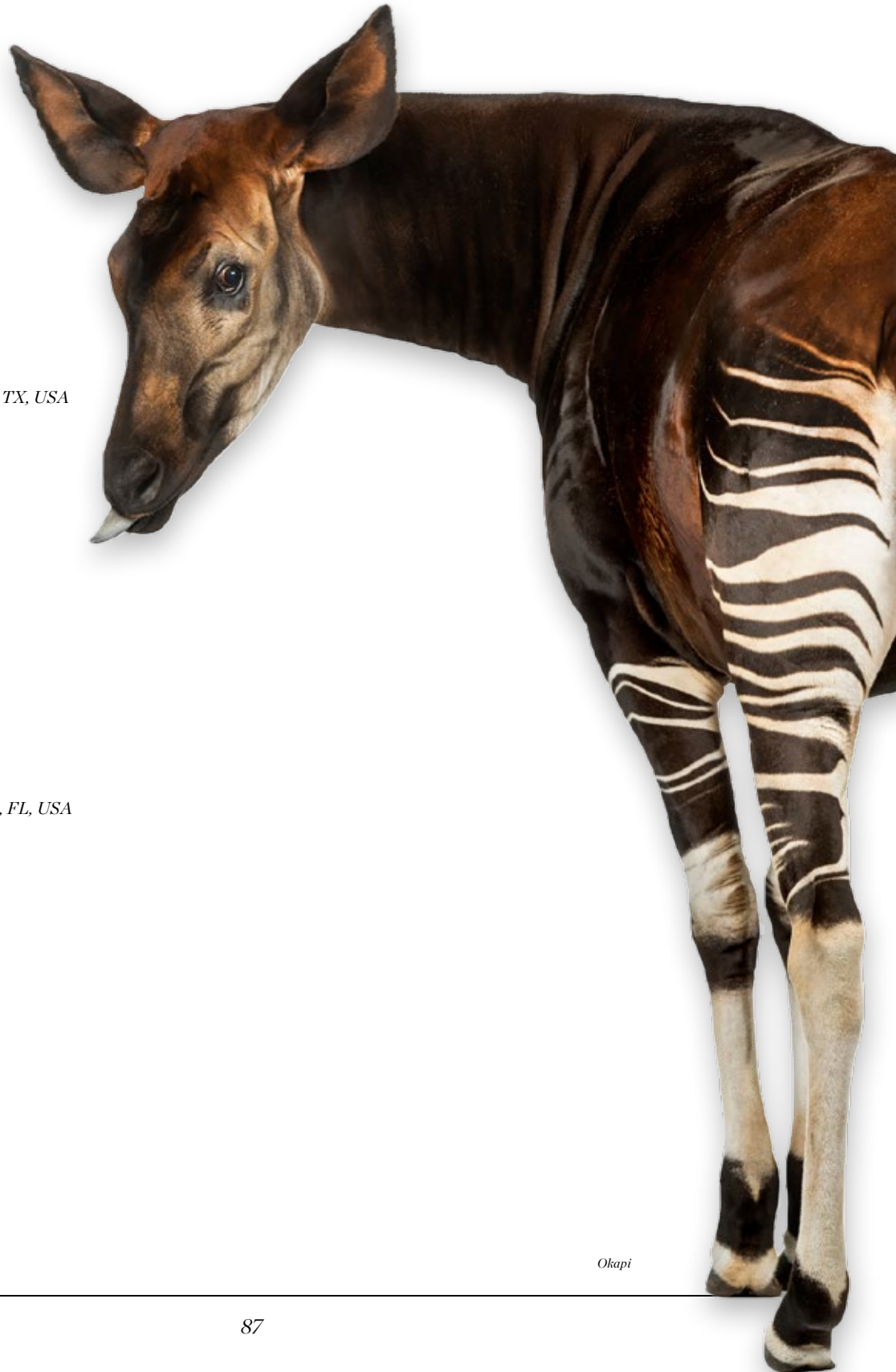
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Okapi

