Committing to Conservation - The World Zoo and Aquarium Conservation Strategy

Population Management

Vision: *As centres of expertise in small-population management, zoos and aquariums are engaged in collaborative, science-based, population-management programmes involving stakeholders to achieve viable populations of selected species both in human care and in the wild.*

Editors' Note

Zoos and Aquarium have tremendous potential to engage the general public in wildlife conservation. These facilities also contribute for conservation research which is fundamental for conservation of threatened species. Since the extinction rate has been accelerated many folds due to anthropogenic activities, modern zoos are contributing for species conservation in the wild as well. This document by WAZA - Committing to Conservation: The World Zoo and Aquarium Conservation Strategy, outlines the key role zoos and aquariums can play in supporting conservation in the wild. We have permission from WAZA to serialize this publication. This is much needed and timely milepost. Happy reading!

> *"No other group of institutions has the scientific knowledge and practical experience to keep and breed thousands of animal species, thereby offering enormous potential for contributing to wildlife conservation."*

The Aichi Biodiversity Targets aim primarily to preserve biodiversity in natural habitats. However, because human impacts now affect all ecosystems, a rising number of species will benefit from, and increasingly require, intensive population management. This trend emphasises the need for zoos and aquariums to be more directly involved in the intensive management of an increasing number of species both in zoological facilities and in the wild. As zoos and aquariums engage in increased conservation breeding for the purpose of preserving biodiversity, careful species selection should be used to focus limited resources on those for which a long-term and broadly protective difference can be made.

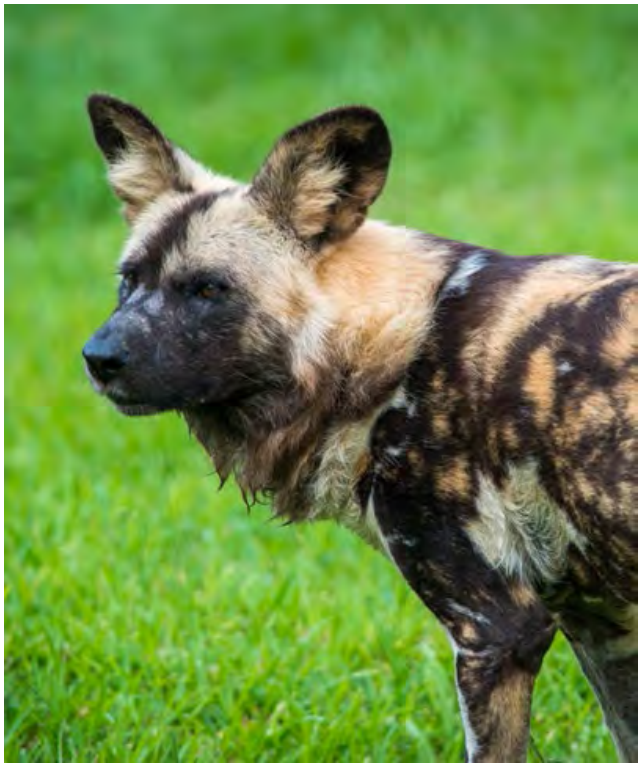
IUCN has recognised that conservation breeding by zoos and aquariums has played a role in the recovery of one-quarter of the 64 vertebrate species whose threat status was reduced according to *The IUCN Red List of Threatened Species*. Breeding animals in human care followed by reintroducing them into the wild as part of a coordinated recovery plan was one of the most frequently cited conservation actions that led to improvements in IUCN Red List status. For birds, conservation breeding and reintroduction helped prevent the extinction of six out of 16 species that would probably have been lost in the absence

of conservation measures. For mammals, conservation breeding and reintroduction have been more successful in improving conservation status than other conservation actions, and contributed to the genuine improvement in IUCN Red List status of at least nine species. Threats to wild populations, and the potential for zoo and aquarium programmes to mitigate these threats, can be identified during a formal species-conservation planning process and/or with application of the revised IUCN *SSC Guidelines on the Use of Ex Situ Management for Species Conservation.*

CURRENT STATE OF POPULATION MANAGEMENT

Zoos and aquariums have assumed increased leadership and responsibility for conservation-breeding programmes over the years. No other group of institutions has the scientific knowledge and practical experience to keep and breed thousands of animal species, thereby offering enormous potential for contributing to wildlife conservation. These zoo-and aquarium-based skills and resources are most effective for achieving conservation outcomes when applied through extensive and cross-disciplinary partnerships.

To fulfil the full suite of conservation roles required, wild-animal populations in human care must be demographically robust, the animals must be behaviourally competent and genetically representative



HOUSTON ZOO, TX, USA
African wild dog

HOUSTON ZOO, TX, USA
Red panda

HOUSTON ZOO, TX, USA
Aruba Island rattlesnake

of wild counterparts, and the breeding programme must be able to sustain these characteristics for the future. Individuals making up viable populations should be healthy in every respect, including a positive animal-welfare state (see *Modern Conservation Organisations and Animal Welfare*), and be sourced legally, sustainably and ethically.

Small populations are rarely sufficient for securing long-term persistence of a species. Conservation-breeding programmes at the regional or global level can help form larger populations, if needed. Most programmes are managed at the regional level for logistical and regulatory reasons. A new way of fostering collaboration inter-regionally is being tested through Global Species Management Plans (GSMPs) administered under the auspices of WAZA. A GSMP involves the management of a particular taxon with a globally agreed set of goals, while building upon and respecting existing regional processes.

International and regional studbooks provide the data that can help facilitate the coordination of such conservation-breeding efforts across zoological institutions. Studbooks are repositories of pedigree and demographic data on animals managed internationally or regionally. International studbooks are administered under the auspices of WAZA. ZIMS is an application that keeps track of individual animals throughout their lives. New features have been added to ZIMS to help studbook keepers, and well-run and up-to-date studbooks will improve the animal and population data ZIMS offers within the application. As ISIS members enter data into ZIMS, they contribute to efficient population management across the zoological community. Furthermore, applying this type of living records system to small populations in reserves could advance the One Plan Approach and make a direct contribution to sustaining wildlife in nature.

It is vital to recognise that space for holding and breeding larger populations of many species is the greatest impediment to building long-term sustainability. This issue over available space was recognised in the 1980s, yet it remains a critical need in building sustainable populations today, with a demand for caring for more species in zoos and aquariums. Another crucial matter is the difficulty that zoological professionals encounter in moving animals (or gametes) for breeding purposes. Regulatory hurdles continue to make trans-regional movement of animals difficult. This threatens the successful implementation of GSMPs and other collaborative inter-regional programmes. In addition, it thwarts cooperative management of species maintained in different regions whose collective population would be sustainable, if individuals in the isolated, regional

populations could be moved predictably for breeding purposes. Stronger efforts should be made to influence legislation in regards to moving animals (or gametes) for breeding purposes.

If the zoological community is to succeed in building sustainable populations, the vital importance of cooperative population management, carried out by programme leaders and studbook keepers, must be recognised and supported. In an environment where financial and other resources are limited, collection planning is crucial and resource allocation is restricted, cooperative population management is integral to the long-term success of zoos and aquariums. Programme leaders and studbook keepers are essential to the conservation of biodiversity and they provide an immeasurable service to the zoological community.

FUTURE OF POPULATION MANAGEMENT

In the *WAZA Vision and Corporate Strategy Towards 2020*, the first operational objective states that a clear link should be established and communicated between field conservation, and the conservation work carried out in zoos and aquariums. In line with this objective, this Strategy postulates the dawning of the era of increasing focus on a more holistic approach to integrated species conservation—the One Plan Approach to species conservation planning. Integrated conservation works along a continuum of management intensity, including little, if any, human intervention in wild populations all the way to intensively managed populations in some reserves and in zoos and aquariums. Furthermore, in order to build sustainable populations, zoological facilities must commit to supporting and training the staff who implement cooperative population management.

Increasingly, as a result of habitat loss, and habitat and population fragmentation, many wild populations have similarities to populations in human care—small in size, fragmented and with limited gene flow between them. For example, animals reintroduced into relatively small, fenced reserves, have necessitated periodic translocation of individuals to mimic

COPENHAGEN ZOO, DENMARK
Conservation breeding and reintroduction of natterjack toads in Denmark and Estonia

natural dispersal and maintain gene flow. This model is referred to as a managed metapopulation, as natural metapopulation processes such as dispersal are subject to human intervention. Metapopulation management involves managing a set of interacting populations under a common conservation goal. Its components may include multiple regional populations managed in human care (including range-country breeding programmes), multiple wild populations (including reintroduced populations) and genome resource banks.

Long-term population viability often requires transfers of animals (or gametes) for breeding. Traditionally, this included the exchange of animals between holders of the population in human care, import of animals from the wild to either bolster existing or establish new populations in human care, and export of animals from populations in human care to the wild. These transfers can be combined under one umbrella of interactive exchanges of animals (or gametes) between populations in the wild and in human care for achieving coincident conservation outcomes. This greatly enhances the capacity to sustain viable populations both in zoological facilities and in the wild. For the sake of effective population management, legislation at national and international levels (including Convention on International Trade in Endangered Species of Wild Fauna and Flora [CITES] regulations) should be adapted and enforced to provide opportunities for such interactive exchanges.

The science of managing small populations in human care is of direct relevance to field-conservation programmes that require intensive wildlife-management techniques. For example, fencing can be highly effective for preventing human–wildlife conflicts in wild-animal populations adjacent to settled areas. However, fenced populations will require human intervention to be viable in the long term. Similarly, fragmented and small populations may require translocation of animals among the few remaining sites to restore gene flow. As land-use change and, increasingly, climate change progress habitat fragmentation, deterioration and destruction, translocation is likely to become an increasingly important conservation tool. This includes considering the role zoos and aquariums may play in the emerging concept of ‘rewilding’, with an aim of restoring ecological processes to recreate functional ecosystems. Strategic guidance is provided in the revised IUCN *SSC Guidelines for Reintroductions and Other Conservation Translocations.*

As the biodiversity crisis intensifies, an increasing number of species will likely require some form of intensive population management (human intervention) in order to avoid extinction. Guidance on if and when activities in zoos and aquariums can be a beneficial component of an overall

species-conservation strategy is provided in the revised *IUCN SSC Guidelines on the Use of Ex Situ Management for Species Conservation*. These guidelines outline a five-step decision-making process that defines potential conservation roles that populations in human care may play, the type of activities needed to fulfil those roles, and the feasibility, risks and likelihood of success. Population management can be used more effectively as a conservation tool if the specific ways in which it can improve population viability or prevent extinction are identified and critically evaluated as part of an integrated approach to species-conservation planning.

In addition to advancing tools for the behavioural, reproductive, genetic, health-related and welfare-related management of intensively managed populations, innovative approaches are needed to enhance the capacity to sustain viable populations both in human care and in the wild, as identified in a recent WAZA-led horizon scan for species conservation by zoos and aquariums. There are existing challenges that also need attention, such as the management of group-living species, low reproductive success, metapopulation management and adaptation to being kept in human care. Research and new technological advances (e.g. genomics) are emerging that have the potential to significantly change and improve how populations are managed (*see Science and Research*). There will be the need to develop new ways and software tools to incorporate these findings and technologies into population management. These would include, for example, off-site breeding centres, extractive reserves and genome resource banks. Developing sustainable, genetically diverse populations is an obligation that serves field conservation and conservation work carried out in zoological facilities, and animal-welfare goals (*see Science and Research*).

A significant way to improve population sustainability and conservation benefit is to improve population management in the range countries of threatened species. Similarly, maintaining good partnerships with the managers of wild populations is paramount to increasing the impact of the breeding programmes. Agreements should be made with the management authority to ensure that everyone knows what targets need to be met to reach the recovery-team goals and which tasks are the responsibility of each institution.

CONCLUSION

Sustainable population management is one of the most critical issues for modern zoos and aquariums, and visitors may find it difficult to differentiate between the needs of an individual animal (animal welfare) and the conservation needs of a species (population management).

Population management within zoological facilities regularly requires animal transfers, mate selection, social-group composition, euthanasia or contraception, and these requirements should be clearly explained to all stakeholders in conservation and welfare terms.

RECOMMENDATIONS

• Because lack of space is the greatest impediment to building long-term sustainable populations, zoos and aquariums should dedicate space devoted to holding and breeding cooperatively managed species as a primary commitment to sustainability.

• Conservation-breeding programmes should be evaluated, both qualitatively and quantitatively, on a regular basis in terms of their success in meeting stated goals and sustainability, and for their potential conservation impact.

• Integrated species-conservation programmes should further advance collaborations between zoos and aquariums, non-governmental organisations, academic institutions, government agencies and other like-minded partners when intensive population management is deemed appropriate for achieving positive conservation outcomes.

• To achieve meaningful conservation outcomes, zoos and aquariums should focus their attention on threatened species for which they can make a difference. Where relevant, regional breeding programmes should link together to address global species-conservation strategies.

• Good husbandry practice and animal welfare are prerequisites for successful breeding programmes and, thus, must be a foundation for all of the work of zoos and aquariums, both within the institutions and in the field; including training and support for the personnel who carry out population management at all levels.

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