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# Intensive Management of Populations for Conservation

## What is an “Intensively Managed Population”?

As habitats are increasingly altered and wildlife populations impacted by human activities, more species are being actively managed to assure their persistence. This has led to a new term among conservationists – Intensively Managed Populations (IMPs). An IMP is one that is dependent on human care at the individual and population level for its persistence (Fig. 1). *Ex situ* populations that depend on managers for food, medical treatment, living space, protection from predation and access to mates are clearly intensively managed. Some wild populations are reliant on at least some of these kinds of individual care and would also fall within the scope of IMPs. Populations living without regular intervention for individuals but requiring management at the population level (e.g. protection from poaching) or habitats will often be “light managed” or “conservation dependent” (Cook 2010).

## The Opportunity for Zoos

The opportunity for zoological institutions to contribute to species conservation through the long-term maintenance of populations is very large. The more than 800 zoos and aquariums that are members of the International Species Information System (ISIS) currently hold more than 600,000 living specimens of about 4,000 species of tetrapod vertebrates. Of these populations, 18% are currently for those species identified at some level of conservation risk in the wild. For mammals and birds, zoos hold about one-fifth to one-quarter of the species identified by the International Union for Conservation of Nature (IUCN) as threatened, while the numbers are much lower for reptiles and amphibians (Conde *et al.* 2011). However, for about half of these threatened species, the total number of individuals held in all ISIS zoos is fewer than 50 specimens, a size below which conservationists do not consider a population to be viable for even the short term.

Concerns regarding the sustainability and not fully realised conservation potential of these zoo populations led to a workshop on the use of intensively managed populations for species conservation held in December 2010 and hosted by San Diego Zoo. Facilitated by the Conservation Breeding Specialist Group (CBSG) of the IUCN Species Survival Commission (SSC), the workshop was attended by 45 zoo professionals from around the world. The purpose of the workshop was to address the challenge of insuring that intensive population management contributes to species living within healthy ecosystems in evolving communities.

This workshop involved focused discussions on those populations that are being intensively managed for the conservation of those species. Zoo populations serve also important educational, aesthetic and cultural values, but these roles do not necessarily involve the maintenance of threatened taxa. Efficient use of resources might require that zoo populations that are used for educational and display purposes also be breeding populations of species needing protection (Conway 2011), and in those cases the management of the populations must be adequate for achieving the species conservation goals as well as the exhibit goals.

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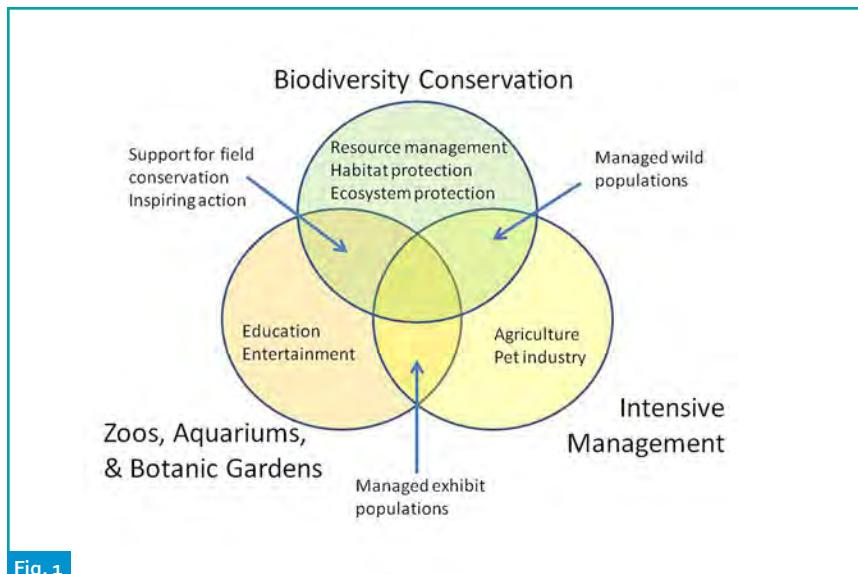


Fig. 1

Intersections of biodiversity conservation, *ex situ* zoological and botanical institutions and intensive management of populations, with examples of the activities that fall within each region. The centre of overlap between all three circles are those *ex situ* populations that are being managed intensively to help achieve their conservation. That region plus the intensively managed wild populations constitutes the focus of the discussions on the use of IMPs for conservation.

Working groups tackled aspects of intensive population management for species conservation, from identifying priority species for management to improving management effectiveness and increasing collaboration. The following goal encapsulates much of what participants believe zoos need to achieve: *The world zoo and aquarium communities are, and are acknowledged as, effective conservation partners in the context of integrated conservation strategies that include intensive population management.*

To work towards this goal, we must:

- Change the current paradigm of the ways zoos contribute to species conservation by committing to conservation missions and adopting appropriate business models to achieve this.
- Incorporate IMPs as potential effective conservation tools into holistic species conservation strategies, increase collaboration with conservation partners and improve understanding of the role of IMPs in conservation.
- Improve the viability and success of long-term IMP programmes, ensuring that each species has a precise and appropriate management plan and adequate resources to achieve its roles.
- Improve the success of species conservation programmes by optimally utilising populations along a management continuum, including exploration of alternative approaches to population management and expanding metapopulation strategies for managing multiple populations effectively.

## The Challenges

Regional zoo associations coordinate the collaborative management of about 800 species, in programmes such as the Species Survival Plan (SSP) of the Association of Zoos and Aquariums (AZA) in North America, the European Endangered Species Programme (EEP) of the European Association of Zoos and Aquaria (EAZA), the Australasian Species Management Program (ASMP) of the Zoo and Aquarium Association (ZAA) Australasia, and others. Often, however, these populations are managed in isolation and *ex situ* efforts often are not integrated with *in situ* conservation needs or activities, even for endangered species. Although we in the zoo community have convinced ourselves, our staff and our public that our managed programmes serve important conservation roles for those species, rarely can this be documented to be the case.

Population goals for managed taxa are usually defined in terms of genetics and demographics, rather than in terms of supporting species conservation. Even given these limited goals, most managed zoo populations are not sustainable. Recent analyses (Baker 2007; Lees & Wilcken 2009) and data presented at the IMP workshop showed that most of these populations are not currently being managed at the numbers of individuals, reliability and predictability of reproduction and levels of genetic diversity that would be required to assure that they can contribute to species conservation. Rather than managing for conservation, the majority of programmes are managing for “acceptable” levels of decay and loss, instead of for truly sustainable, resilient and adaptable populations that will be available and suitable to serve conservation needs in the future. Not surprisingly, some colleagues within the conservation and scientific community do not see the conservation value of intensively managed *ex situ* populations.

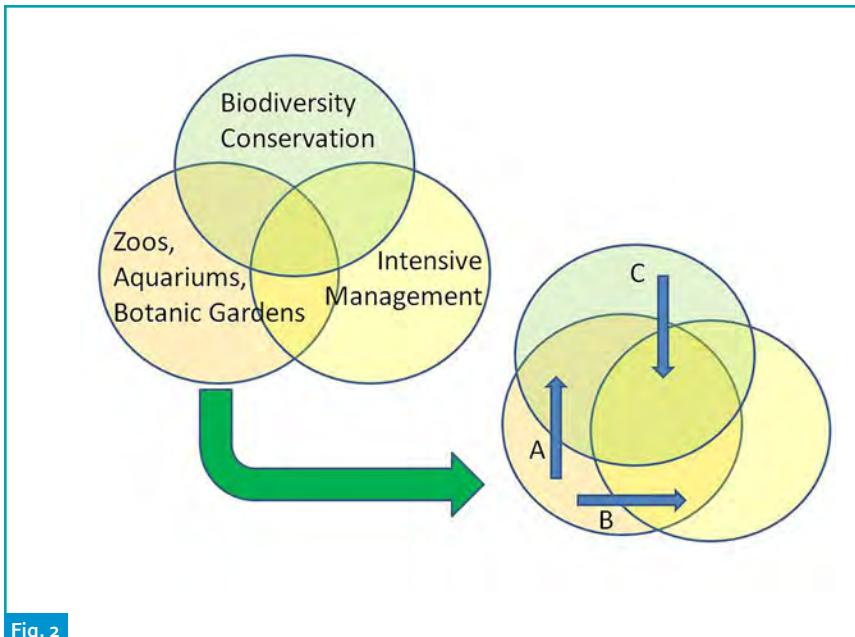


Fig. 2

The desired and expected shifts of emphasis among roles. *Ex situ* facilities have the capacity and responsibility to focus more of their resources on actions that directly lead to improved species conservation (arrow A). Moreover, to be able to sustain also exhibit populations for other purposes, increased management will be needed for those *ex situ* populations that will not be easily replaceable (arrow B). As wild environments continue to be degraded by increasing human activities, it is expected that more species conservation will require coordinated intensive management of both *ex situ* and *in situ* populations (arrow C).

Zoos can become and be seen as very powerful forces for species conservation, not only through the significant resources that they direct towards field conservation programmes (to which members of the WAZA network contribute more than US\$ 350 million per year; Gusset & Dick 2011), but also through the direct conservation roles of the populations managed within their collections. Reaching this goal will require strategic assessment, planning and action, and this will occur only if zoos shift their focus from managing facilities as places with animals that also do some conservation, to managing themselves as conservation organisations that support *ex situ* animal populations in order to

reach conservation goals (Fig. 2). The World Zoo and Aquarium Conservation Strategy (WAZA 2005) identifies conservation as the primary purpose for modern zoological institutions. However, most zoos are still managed in ways that demonstrate that they are focused first on exhibition; they attend to conservation only when resources permit or when the conservation serves the other goals of the institution.

## Changing the Paradigms

Effecting this shift will not be easy and will require that zoos change a number of current practices and paradigms. At the outset they need to work more collaboratively with others in the conservation community, working together to assess species for their full range of conservation needs and developing holistic species management plans. There are a few shining examples of collaboration between Taxon Advisory Groups (TAGs) of regional zoo associations and the IUCN/SSC Specialist Groups; this type of interaction needs to be expanded. The networks of taxon conservation experts in the IUCN/SSC Specialist Groups should be best able to identify which taxa require intensive management as part of the species conservation strategies. However, they are unlikely to provide that guidance unless they view the zoo community as effective partners in conservation. Achieving that level of confidence in the role of zoos in species conservation will require changes in both the practices and the perception of zoos.

Methods are needed to assess the need and value for intensive management and also for prioritising these taxa; factors to be taken into account include existing expertise, capabilities, resources and likelihood of success. This cannot be accomplished without reaching outside of the *ex situ* community to embrace other stakeholders, including field biologists, academics, regional and global conservation organisations and interdisciplinary specialists such as sociologists.

With clear goals defined by holistic species management plans, *ex situ* programmes will need to be refined and restructured to maximise success. The traditional approach of trying to sustain zoo populations only through breeding within exhibition programmes will be sufficient for only a relatively small number of species – those that are so popular that large exhibit populations will be maintained, that breed readily in exhibit facilities with little need for specialised facilities and that are easy to transport and amenable to periodic rearrangement of social groups. For the remaining species, a broader range of population management strategies needs to be considered along a management continuum (Conway 2011). For some species, this may mean Global Species Management Plans (GSMPs) administered by WAZA. For others, it may mean placing breeding individuals into specialised breeding facilities, while ensuring that exhibit needs can be met with non-breeding animals. For yet others, it may mean exploring the concept of extractive reserves, a strategy that the aquarium community has already made progress in developing.

Accomplishing the above will require additional resources and has implications for how *ex situ* institutions structure their financial plans. We will need to better understand our business models, questioning assumptions about what we believe may negatively impact our ability to manage species effectively. For example, zoos often assume that the public wants to see a huge variety of species and that if species collections are similar from zoo to zoo, then attendance will suffer. We assume that exhibits need to be large and elaborate to be successful. These assumptions need to be tested, as they impact our ability to develop business plans that expand our ability to adequately resource intensive population management in support of conservation goals.

There are a number of factors that have contributed to a lack of success for many IMPs. Common problems include lack of necessary husbandry expertise, regulatory obstacles, space limitations, inadequate founder base and lack of institutional commitment, exacerbated by poor communication among staff and lack of accountability for those responsible for implementation of recommendations. None of these obstacles is insurmountable, but overcoming them will require commitment to change. Discussion among IMP workshop participants led to the identification of specific actions needed in areas from species prioritisation to collection planning, exploration of new management approaches and integration with other conservation efforts and partners. Putting these recommendations into action to achieve success will require concerted efforts by zoo associations, zoos and individuals. Efforts are already underway to implement some of the necessary activities identified at the IMP workshop. The scope and urgency of the species conservation crisis obligates us to move ahead as quickly as possible.

## References

- Baker, A. (2007) Animal ambassadors: an analysis of the effectiveness and conservation impact of *ex situ* breeding efforts. In: *Zoos in the 21st Century: Catalysts for Conservation?* (ed. by Zimmermann, A., Hatchwell, M., Dickie, L. A. & West, C.), pp. 139–154. Cambridge: Cambridge University Press.
- Conde, D. A., Flesness, N., Colchero, F., Jones, O. R. & Scheuerlein, A. (2011) An emerging role of zoos to conserve biodiversity. *Science* 331: 1390–1391.
- Conway, W. G. (2011) Buying time for wild animals with zoos. *Zoo Biology* 30: 1–8.
- Cook, R. A. (2010) Defining what it means to save a species – the species conservation program of the Wildlife Conservation Society. In: *Proceedings of the 65th WAZA Annual Conference* (ed. by Dick, G.), pp. 30–31. Gland: WAZA.
- Gusset, M. & Dick, G. (2011) The global reach of zoos and aquariums in visitor numbers and conservation expenditures. *Zoo Biology* 30: in press.
- Lees, C. M. & Wilcken, J. (2009) Sustaining the Ark: the challenges faced by zoos in maintaining viable populations. *International Zoo Yearbook* 43: 6–18.
- WAZA (2005) *Building a Future for Wildlife: The World Zoo and Aquarium Conservation Strategy*. Berne: WAZA.