

Special
ISSUE

N° 16 | Winter 2023

CAT PLOT FLOW

The jaguar in South America – status review and strategy





CATnews is the newsletter of the Cat Specialist Group, a component of the Species Survival Commission SSC of the International Union for Conservation of Nature (IUCN). It is published twice a year, and is available to members and the Friends of the Cat Group.

For joining the Friends of the Cat Group please contact Christine Breitenmoser at ch.breitenmoser@kora.ch

Original contributions and short notes about wild cats are welcome

Send contributions and observations to ch.breitenmoser@kora.ch.

Guidelines for authors are available at www.catsg.org/catnews

This **Special Issue of CATnews** has been produced with support from the Albuquerque BioPark, Albuquerque, USA

Design: barbara surber, werk'sdesign gmbh
Layout: Eline Brouwer, Tabea Lanz and Christine Breitenmoser
Print: Stämpfli AG, Bern, Switzerland

ISSN 1027-2992 © IUCN SSC Cat Specialist Group
December 2023

The designation of the geographical entities in this publication, and the representation of the material, do not imply the expression of any opinion whatsoever on the part of the IUCN concerning the legal status of any country, territory, or area, or its authorities, or concerning the delimitation of its frontiers or boundaries.

Editors: Christine & Urs Breitenmoser
Co-chairs IUCN/SSC
Cat Specialist Group
KORA, Talgut-Centrum 5, 3063 Ittigen,
Switzerland
Tel ++41(31) 951 90 20
Fax ++41(31) 951 90 40
<u.breitenmoser@kora.ch>
<ch.breitenmoser@kora.ch>

Associate editors: Luke Hunter
Stacey Johnson

Cover Photo: Jaguar in the Pantanal
Photo: Patrick Meier

STACEY JOHNSON^{1*} AND BAIRD FLEMING²

Ex situ conservation of jaguar

Jaguars *Panthera onca* have been managed under human care for centuries for a variety of purposes. Until recently, jaguar management in zoological collections has tended towards a generic big-cat style, often to the detriment of species-specific psychological and behavioural considerations. Prospects for the jaguar's importance as a representative of eco-systems in which it lives, however, have improved. There are now four programmes (ALPZA, JAZA, AZA, and EAZA) that identify population sustainability, best practice animal care and jaguar welfare as primary objectives. Animals have (infrequently) been exchanged among EEP, SSP and ALPZA studbook institutions based on genetic and demographic recommendations. Both the SSP and EEP recognise that their animals serve as refugium populations, against a time when wild jaguars are so few that reintroduction could become necessary. Ex situ conservation includes significant potential to utilise data contained in studbooks and other documentation kept by zoos to inform and support field data and analysis. The EEP and SSP management teams collectively possess decades, if not centuries, of professional expertise with jaguar care and management. Accredited zoos have blended field and ex situ activity for some time as the OnePlan Approach has crystallised. There is reason for optimism: as there is a widening conservation niche for zoos, and a brighter, more robust outlook for jaguars.

Jaguars have been managed under human care for centuries for a variety of purposes. Spanish accounts of first contact with Mesoamerican civilisations mention jaguars kept by rulers and elites in menageries and for sacrifice (Schele & Miller 1986, Tedlock 1997). Down to the present day, the species has been held in private hands for a variety of other reasons, including as pets, status symbols, or as non-releasable animals rescued from unhealthy or dangerous captive conditions (S. Johnson, pers. comm.). Although none of these circumstances necessarily constitutes species conservation per se, just as some noteworthy professional jaguar hunters

are recognised as contributors to conservation, some dedicated private holders have improved the understanding of jaguar behaviour and husbandry.

Since at least the last quarter of the 19th century, the species has also been managed in zoological parks with varying degrees of focus and success (AZA 2019). Whether kept as part of the 'complete set' of big cats, as a geographic representative or an apex predator, the jaguar's story in zoos has never been complete. Unlike tigers and lions, whose better-known ecological roles are frequent themes in popular culture and nature literature, the historically superficial and often

inaccurate knowledge of jaguar traits and relationships continues to hinder meaningful conservation. The evolution of the modern wildlife conservation ethic – whose beginning dates to the publication of *A Sand County Almanac* by Aldo Leopold in 1949 – outpaced both the ability to manage jaguars sustainably ex situ and the emergence of a clear picture of wild jaguar ecology. As a result, the species has spent more than 60 years caught between perception as a menace to livestock and elevation to status as an ecological icon. Until recently, jaguar management in zoological collections has tended toward a generic style, often to the detriment of species-specific psychological and behavioural considerations. One recommendation made by a veteran mammal curator when the first jaguar husbandry guidelines were written in 2003 was, "Take the tiger manual and make a global search/replace with the word 'jaguar'." While largely effective in terms of diet, security and other material parameters, that traditional approach had produced generations of zoo jaguars being treated symptomatically for chronic stress-related conditions without identifying the underlying causes. The recommendation for the husbandry manual was rejected but it remains evident that continued investigation into jaguar psychological welfare in zoo situations is necessary. Nevertheless, much of what is known first-hand about the jaguar life cycle, anatomy, physiology and other aspects of its particular biology comes from observations recorded and documents kept by professional zoos. This information serves as a foundation and comparative tool for field study and conservation.

In Latin America, zoos are frequently required to accept jaguars rescued or confiscated by wildlife authorities. While this is justifiably considered an ex situ conservation role, it can be complicated by negative impacts on animal welfare when over-crowding occurs or jaguars with health and behavioural conditions arrive unexpectedly. Managing this practice as a mutually beneficial partnership in which wildlife agencies and zoological institutions plan and prepare for the placement of jaguars could measurably improve their welfare while establishing collaborative networks to manage genetically and demographically healthy populations. The direct benefit would be to strengthen the services provided by zoos and, indirectly, positive attention from the public, conservation NGOs and other collaborators could generate support for habitat management and law enforcement.

84



Fig. 1. Asociación Latinoamericana de Parques Zoológicos y Acuarios Jaguar Studbook.

Professional animal management practices and data collection in zoos

Resulting from a burst of field research over the past two decades and focused interest in better zoo care for jaguars, prospects for the jaguar's importance as a real representative of the many ecosystems in which it lives have improved. In fact, the capacity to maintain ex situ populations is not in question and a number of resources are available to support the effort. For example, studbooks established and managed by zoo and aquarium associations document population histories through birth, death and pedigree data entry on individual animals. They are the foundations of collaborative species management programs, and four are kept for jaguars: in Europe, Japan and the Americas. Two zoo breeding and population management programs for the species are active as well.

The regional jaguar studbook for the Asociación Latinoamericana de Parques Zoológicos y Acuarios ALPZA (Fig. 1) is the newest, initiated in 2009 to consolidate zoo population data across the Americas outside Canada and the USA and represents 28 institutions. Studbook coordinator Lic. Adrián Sestelo, Fundación Bioandina, Argentina, identified it as the first step toward developing breeding plans across Latin American zoos that conserve ex situ genetic diversity for the species, while

promoting cooperative management on a regional scale (ALPZA 2010).

A regional studbook for the Japanese Association of zoos and Aquariums JAZA has been kept since the early 1980s. JAZA maintains its JAZA Collection Plan JCP for rare species conservation. The jaguar is categorised in the Plan as a studbook species. The population manager investigates the regional population dynamics and publishes a studbook every year. JAZA member zoos work together to increase the population and its genetic diversity by means of domestic transfers and introduction of founders from abroad (JAZA 2019).

The European Association of Zoos and Aquaria EAZA maintains a regional studbook containing records dating back to the early 20th Century overseen by an EAZA Ex situ Programme EEP with 40 participating institutions. Anne Rikke Winther Lassen, Randers Regnskov Tropical Zoo, Randers, Denmark, is the studbook keeper and coordinator with the support of an EEP Species Committee representing nine EAZA zoos. Jaguar EEP members individually support in situ conservation and research for jaguars. The goal of the Jaguar EEP is to maintain a healthy population fulfilling the need of EAZA zoos to hold jaguars for exhibition, education and conservation research (R.

Biddle former Jaguar EEP Coordinator and Studbook Keeper, pers. comm.).

The Association of Zoos and Aquariums AZA maintains a regional studbook including data back to the 1870s from zoos and facilities within and outside AZA. It manages a Species Survival Plan SSP with 46 AZA member institutions. Stacey Johnson, Roger Williams Park Zoo, United States of America, is the studbook keeper and SSP coordinator with the support of a management group and advisors representing four AZA zoos plus several retired professional colleagues and Jaguar SAFE (Saving Animals From Extinction) coordinator, representing 36 partner zoos and with the support of a management committee presently representing two AZA zoos (S. Johnson, pers. comm.).

All four programs identify population sustainability, best practice animal care and jaguar welfare as primary objectives. In its most literal sense this is the conservation of those animals in human care. Although infrequent, animals have been exchanged among EEP, SSP and ALPZA studbook institutions based on genetic and demographic recommendations.

Both the SSP and EEP recognise that their animals serve as refugium populations, against a time when wild jaguars are so few that reintroduction could become necessary. Their

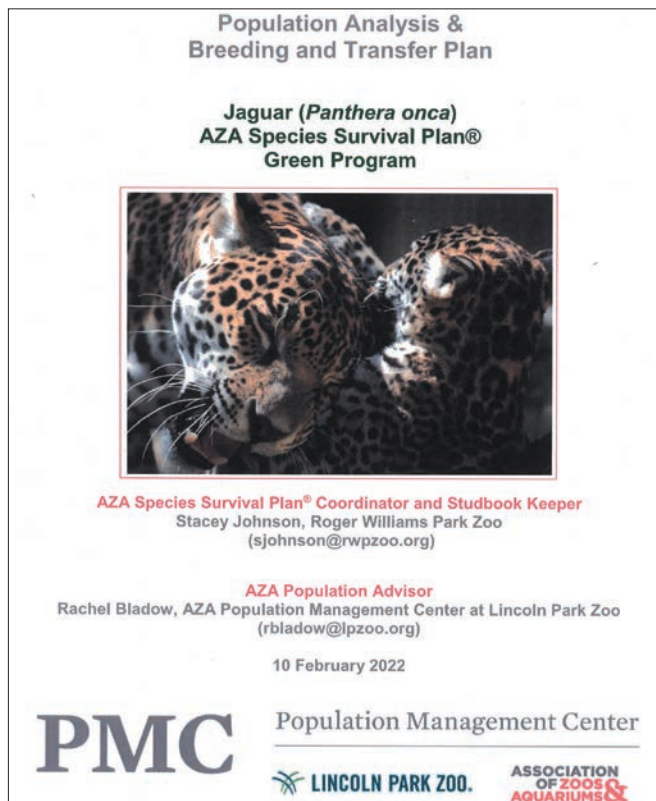


Fig. 2. Association of Zoos and Aquariums Jaguar Species Survival Plan® Breeding and Transfer Plan.

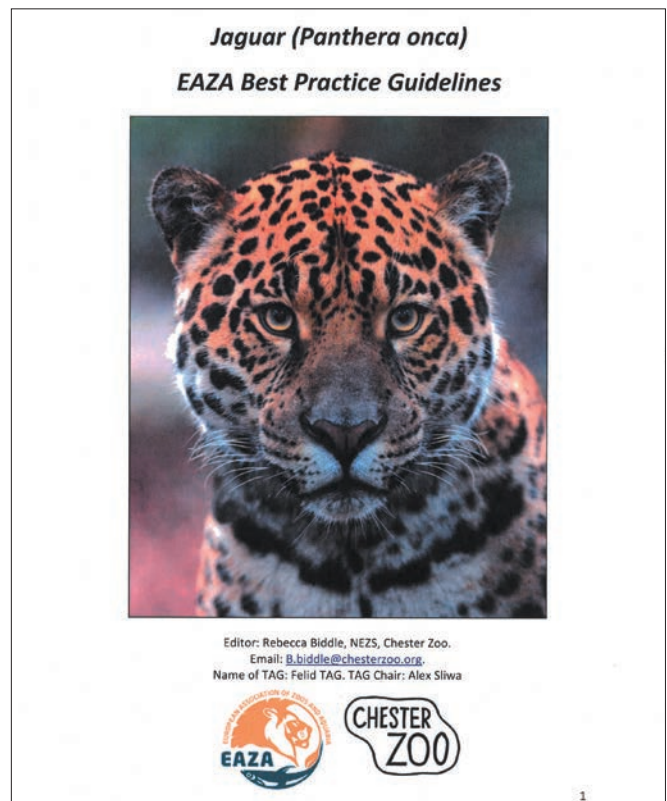


Fig. 3. European Association of Zoos and Aquaria Jaguar Best Practice Guidelines.



Fig. 4. Pronatura Península de Yucatán, Fort Worth Zoo, and the Instituto de Ecología of the Universidad Nacional Autónoma de México collaborated from 2004-2010 to estimate jaguar population density in and near the Ría Lagartos Biosphere Reserve (Photo: PPY-FWZ-IEUNAM).



Fig. 5. Participants in the IUCN SSC Cat Specialist Group workshop to draft a conservation strategy for South American jaguars, San Diego Zoo Safari Park, California, November 2019 (Photo: IUCN SSC Cat Specialist Group).

attention to genetic diversity and age distribution targets the conservation of an ex situ resource while keeping an eye on the potential for future in situ population rescue (Fig. 2). Living jaguar somatic cells can be cryobanked reliably (M. Houck, pers. comm.), and the SSP is taking initial steps to identify and freeze a subset of its population to preserve genetic diversity. Semen has also been banked at several institutions and as assisted reproduction technology procedures (e.g. artificial insemination, in vitro fertilisation and embryo transfer) are developed for the species, gametes can be frozen and used in jaguars as they have been in domestic species. Again, such management may serve to ensure living

zoo populations as well as offer insurance against wild population collapse in the future. Ex situ conservation includes significant potential to utilise data contained in studbooks and other documentation kept by zoos to inform and support field data and analysis. With varying levels of completeness, information on longevity, health, reproduction, behaviour, body size and other physical characteristics has been kept for over a century. Combined, the robust dataset in the four regional studbooks' historical populations represents more than 2,000 individuals. The EEP and SSP management teams collectively possess decades, if not centuries, of professional expertise with jaguar care and

management. The SSP produced a comprehensive, peer-reviewed Jaguar Care Manual in 2016 (AZA 2016); and the EEP produced its Best Practice Guidelines in 2019 (EAZA 2018; Fig. 3) with an additional Veterinary Guidelines document in preparation at the time of this writing.

Scientific investigation in laboratory and field lead to conservation action

Among professional zoos and aquaria, alliances of institutions with aligned interests may arise external to recommendations and requirements of association membership. For example, the Zoo Conservation Outreach Group ZCOG is a coalition of zoos and aquariums that promotes wildlife and habitat conservation throughout the Americas. ZCOG delivers technical, material, and financial support to institutional zoo colleagues and conservation programs in Latin America and the Caribbean Basin, and develops conservation leadership capacity through scholarships and training. Their conservation and research projects span numerous species and ecosystems, and have included jaguar monitoring in Brazil's Amazon, Atlantic Forest, and Cerrado biomes (D. Hilliard, pers. comm.).

Initiated for defined purposes or through the individual interests of investigators, scientific studies requiring long-term data and/or sample collection have been undertaken by zoos and their academic partners for decades. For example, post-mortem reproductive tissue samples have been collected from female SSP jaguars since the mid-1990s, first by the University of California, Davis, and now by Michigan State University. Results include numerous publications on female jaguar susceptibility to reproductive cancer. Subsequent research on mammary cancer in *Panthera* species has been supported by post-mortem and biopsy sampling of jaguars and by studbook pedigree data. Research into assisted reproduction techniques and technology for jaguars is presently underway, conducted by the Cincinnati Zoo and supported by numerous Jaguar SSP institutions.

In addition to grant-funded, large-scale research, many zoos have agreements with educational institutions to offer opportunities for experiential training to budding scientists from across a range of ages and levels, whether on-site data collection and analysis, through funding field programs or in combination. AZA has its Conservation Grants Fund, which offers financial resources for peer-reviewed proposals submitted by indiv-

idual members, several of which have gone to jaguar projects since the turn of the century (AZA 2022).

Individual zoos have long worked singly or have banded together to support prioritised jaguar conservation endeavours (Fig. 4). Two additional present examples are the Randers Rainforest Zoo, Denmark, providing operating costs to the Bigai Biological Project in Ecuador (R. Biddle, pers. comm.) and the Jaguar SSP/SAFE funding two full-time wildlife rangers for the Cockscomb Basin Wildlife Sanctuary in Belize (S. Johnson, pers. comm.).

The previous examples illustrate how accredited zoos have blended field and ex situ activity for some time as the OnePlan Approach has crystallised. Yet for decades, zoos already provided financial resources to universities, NGOs and individuals for a variety of jaguar programs and projects – especially since the advent of digital camera traps as a relatively inexpensive, highly effective, means of data collection. They have also served as controls and test sites for other emerging field techniques including hair collection and faecal genomic analysis. Their expertise in animal care, medicine, immobilisation and transportation is readily available and occasionally utilised by government agencies. So, as zoos continue to dedicate more resources and expertise to conservation and science the distinction between ex and in situ blurs. Regional zoo and aquarium associations that make accreditation a condition of institutional membership require increasingly rigorous attention to planning, execution and assessment of scientific investigation and conservation action (AZA 2022, EAZA 2022a, 2022b). A growing number of these zoos and aquaria employ trained scientists whose mandate is to conduct programs connecting their institutions with the natural world and to publish it in the scientific literature.

Finally, the workshop that led to this publication is an example of coordinated ex situ jaguar conservation leading to meaningful results for the species in situ. San Diego Zoo Wildlife Alliance responded to a need identified by the Cat Specialist Group for a multilateral South American conservation action plan with objectives, goals and funding to gather experts from range countries at its Beckman Center for Conservation Research (Fig. 5). Facilitated by the Specialist Group's co-chairs, whose stipend was provided by the Albuquerque BioPark, the workshop was the first meeting of its kind and was a deliberate first action to link the emergence of a coordinated conservation strategy



Fig. 6. Jaguar SAFE (Photo: AZA).

with a regional zoo association's species conservation program. This plan is the blueprint for AZA's Jaguar SAFE programme for the coming decade (Fig. 6). While not every goal in the plan falls within the capability of Jaguar SAFE members, they can support most of them and, indeed, are positioned uniquely to achieve others.

Identifying and acting upon opportunities presented in this workshop to share ideas, expertise and resources among academic, government, NGO and professional zoo colleagues offers reason for optimism: a widening conservation niche for zoos, and a brighter, more robust outlook for jaguars.

References

- Asociación Latinoamericana de Parques Zoológicos y Acuarios (ALPZA). 2010. Studbook Latinoamericano de Yaguareté (*Panthera onca*). Sestelo A. (studbook keeper). Buenos Aires, Argentina.
- Association of Zoos and Aquariums (AZA). 2019. AZA Regional Studbook – Jaguar (*Panthera onca*). Johnson S. (studbook keeper). Silver Spring, Maryland, United States of America.
- Association of Zoos and Aquariums (AZA). Conservation Grants Fund webpage: <https://www.aza.org/cgf>.
- Association of Zoos and Aquariums (AZA). 2022. The Accreditation Standards and Related Po-

licies. Silver Spring, MD: Association of Zoos and Aquariums.

- AZA Jaguar Species Survival Plan. 2016. Jaguar Care Manual. Johnson S. (Ed.). Silver Spring, Maryland, United States of America.
- European Association of Zoos and Aquariums (EAZA). 2018. EAZA Jaguar (*Panthera onca*) Best Practice Guidelines. Biddle R. (Ed.). Amsterdam.
- European Association of Zoos and Aquariums (EAZA). 2022a. EAZA Conservation Standards. Amsterdam.
- European Association of Zoos and Aquariums (EAZA). 2022b. EAZA Research Standards. Amsterdam.
- Japanese Association of Zoos and Aquariums (JAZA). 2019. Japanese Studbook for Jaguar (*Panthera onca*). Kanno H. (studbook keeper). Kobe, Japan.
- Schele L. & Miller M. 1986. The Blood of Kings: Dynasties and Ritual in Maya Art. George Braziller, Inc., New York.
- Tedlock D. 1997. Breath on the Mirror. University of New Mexico Press, Albuquerque, NM.

- ¹ Executive Director and Jaguar SSP/SAFE Coordinator and Studbook Keeper, Roger Williams Park Zoo, Providence, Rhode Island, USA * <sjohnson@rwpzoo.org>
- ² DVM, Director, Hamilton Zoo, Hamilton, New Zealand