Proceedings of the 49th Annual American Association of Zoo Keepers National Conference

AAZK OMAHA 2024

Together We Grow

September 22-27, 2024

Papers

AMERICAN ASSOCIATION of ZOO KEEPERS

OMAHA'S HENRY DOORLY ZOO & AQUARIUM

Papers

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Lewa Wildlife Conservancy Update

Dr. Dominic Maringa, Lewa Wildlife Conservancy, dominic.maringa@lewa.org

Dominic Maringa Ikuathu, Ph.D. is Lewa's Head of Conservation and Wildlife Programs. Dr. Maringa brings more than 13 years of experience in natural resource conservation and community development. Before joining Lewa, he worked on forest conservation for Ngare Ndare Forest Trust, one of Lewa's close conservation partners, and on the conservation and protection of water catchment areas for the Ngusishi Water Users Association.

Dr. Maringa will be presenting on Lewa's primary conservation and research initiatives for 2024, including initiating an all-inclusive Weather and Climate Information Centre for the region, as well as hosting and equipping the regional veterinary laboratory for northern Kenya. Additionally, Lewa is embracing the latest technological advances for more efficiency in wildlife and ecological monitoring and reporting using the LoRaWAN network to ensure our activities align with the hydrological balance. As a conservation model in the region, we continue populating new and existing rhino sanctuaries, as well as championing the National Pancake Tortoise Recovery Strategy in collaboration with government agencies. Human-wildlife coexistence being a primary philosophy, we shall create more awareness, and ensure wildlife dispersal through landscape connectivity corridor creation and monitoring. We recognize our role in nurturing generations in readiness for conservation by ensuring our Conservation Education Program continues to be the referral center of knowledge to school children, women, and youth and proudly lead the way in supporting other centers of excellence in the region.

LEWA
WILDLIFE
CONSERVANCY

A UNESCO World Heritage Site inscribed in 2013

Annual Report

2023

LEWA WILDLIFE CONSERVANCY

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VISION

Lewa envisions a future where people across Kenya value, protect and benefit from wildlife.

MISSION

Lewa Wildlife Conservancy serves as a model and catalyst for the conservation of wildlife and its habitat. It accomplishes this through the protection and management of species, the initiation and support of community conservation and development programmes, and the education of neighbouring communities on the value of wildlife.

Protecting Wildlife, Transforming Lives

The long-term conservation of the wildlife and habitats in Lewa Wildlife Conservancy relies on the success of its neighbours, including farms, communities, conservancies and public protected areas alike.

Throughout 2023, our commitment to improving the lives and livelihoods of the indigenous communities around us and empowering them to own the conservation agenda endured. Follow along to learn the incredible milestones we achieved in community-based conservation and wildlife management with your partnership and support.

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CONSERVATION AND WILDLIFE

Lewa Wildlife Conservancy has demonstrated remarkable success in fostering a resilient and diverse ecosystem that supports stable and growing wildlife populations. The Conservancy's unwavering dedication to habitat protection, sustainable practices and community engagement has played a pivotal role in achieving these milestones.

Lewa employs a combination of research, advanced technology and community involvement to safeguard and oversee the conservation of numerous endangered species. This holistic approach has notably boosted wildlife populations, particularly our flagship species, the rhino, as well as other endangered species, such as the Grevy's zebra and pancake tortoise. The Conservancy serves as a safe haven for a variety of wildlife, including elephants, lions, birds and reticulated giraffes and made the following strides in 2023:

260 rhinos were present in Lewa, **132** of them **black rhinos** and **128, white rhinos**

Lewa's Grevy's zebra population increased by **19**%. Currently, **359** can be found in Lewa, up from 310 in 2022

42 rhinos, underwent ear notching and **7** rhinos were equipped with long range transmitters, enabling real-time tracking of their movements

Surveys and monitoring efforts revealed an increase in avifauna, a high diversity of waterbirds and raptors, an observable rise in raptor nesting activities and successful raptor breeding

The number of herpetofauna in the landscape surged, with **192** pancake tortoises and **46** terrapins being sighted

4,550 trees were planted at the Meru Bongo and Rhino Sanctuary by the community, Community Forest Associations, Lewa and other stakeholders, in preparation for the arrival of mountain bongos

5 acres of land with invasive species was cleared

9,176 acres of exclusion zones were established at Kona Safi, Kangauru, Mlima Loishimi and Sirikoi, to improve vegetation diversity

Human-wildlife conflict cases decreased by **11%**

EDUCATION

The Lewa Education Programme (LEP) provides crucial support to over 9,000 students every year and is one of the most effective ways in which Lewa fosters development, at both the individual and communal level, in neighbouring communities. By increasing the opportunities available to students, Lewa is ensuring young people become socially responsible and productive members of society.

LEP is advancing education in the landscape by building the capacity of teachers, school leaders, and parents, developing infrastructure, providing students with scholarships and conservation education trips, and operating a digital literacy programme. LEP seeks to address needs expressed by teachers, schools and community members. The Programme produced the following outcomes in 2023:

Over 1,000 learners in Lewa-supported schools benefitted from the Feeding Programme

More than 300 students received full scholarships through Lewa's Bursary Programme

At least **4,243** learners and **657** teachers visited the conservancy's Conservation Education Centre in 2023

53% of the students who completed secondary school in 2023 are poised to pursue bachelor's degree courses in university

The Programme expanded its coverage to four additional schools, bringing the total number of schools supported to **27**

47 students successfully transitioned from secondary to tertiary education

44 Lewa staff mentored **977** students across the **27** LEP-supported schools

LEP recorded a **30% increase** in secondary school registration, with **65 students** enrolling in the programme, exceeding the target of 50

51 high school graduates received guidance on university and college course selection

202 Board of Management members and **27** headteachers in Lewa-supported schools were trained on good governance and school management

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DIGITAL LITERACY PROGRAMME

EDUCATION

Lewa's Digital Literacy Programme is an integral component of the Lewa Education Programme. In 2016, the Kenyan government distributed over a million digital tablets to more than 19,000 public primary schools across the country as part of its mandate to ensure every Kenyan child receives quality education that equips them with 21st century skills.

To supplement the national programme and ensure students in remote northern Kenya schools have access to quality education, Lewa, through its Digital Literacy Programme provided free, age-appropriate digital content that was accessible offline, as well as library infrastructure and management technology.

Through the Digital Literacy Programme, in 2023:

552 tutorials were created using Camtasia, facilitating comprehensive learning

182 teachers and **4,916 learners** in **25** Lewa-supported schools actively engaged with digital curriculum resources

207 learners successfully coded **12** projects using Scratch

4,500 learners and **150 teachers** demonstrated improved knowledge and skills in digital literacy

6,261 experiments were conducted on PhET, reflecting **287** hours dedicated to this interactive computer simulation platform

358 tablets were distributed across **14** schools

490 topics from Grade 4 through secondary school were digitized

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SCHOOL INFRASTRUCTURE PROGRAMME

EDUCATION

Lewa seeks to increase access to education by addressing the most urgent needs of neighbouring schools and building their capacity to manage education resources. Every year, the Conservancy invests in infrastructure development, improving the learning conditions of students across the 27 Lewa-supported schools in the Lewa-Borana landscape and its environs. Lewa implemented the following infrastructure projects in 2023:

Constructed a **24-door sanitation block** at Lokusero Secondary and Ntalaban Primary School

Constructed a **kitchen with energy-saving stoves** at Junior Pupils Preparatory School

Renovated **classrooms** at Enaikishomi Primary School

Constructed **classrooms** in Ngare Ndare Secondary and Victoria High School

Fenced Shambani Primary and Victoria High School

Constructed a **dining hall** and donated furniture to Lokusero Secondary School and Rugusu Primary School

Issued **Early Childhood Development Education equipment** to Enaikishomi and Subuiga Primary School

COMMUNITY DEVELOPMENT

The communities around Lewa perceive conservation as a multifaceted resource that fosters sustenance, economic prospects, healthcare and more.

Lewa envisions a future where people across Kenya value, protect and benefit from wildlife. Therefore, the Conservancy works hand in hand with indigenous communities and deems them indispensable partners in its conservation initiatives.

Operating at the nexus of wildlife conservation and sustainable development, Lewa actively supports its neighbouring communities and addresses their most pressing needs, providing access to clean water, education, better healthcare and vocational skills training. Lewa's community development programmes positively impact the lives of 205,000 people, underscoring our commitment to fostering holistic community well-being.

Women's Micro-enterprise

Since its inception in 2003, the Women's Micro-enterprise Programme (WME) has supported over 2,000 women from Lewa's neighbouring communities in starting small businesses and promoting livelihood diversification. The established enterprises include retail shops, flour mills, hair salons, and tailoring and livestock-keeping businesses. With the support of the Women's Microfinance Initiative, WME provides women with microloans, training and a business networking platform.

The Programme achieved the following milestones in 2023:

2,050 women actively participated in the activities of the WME, a **14%** increase from the previous year

741 women underwent entrepreneurship and business management training

723 women benefitted from mentorship and counselling sessions provided during workshops and exposure visits

WME achieved an **80% loan** repayment rate

32 women groups received governance and management training, promoting transparency and accountability in their operations

HEALTHCARE

COMMUNITY DEVELOPMENT

With the recent acquisition of a modern ambulance, Lewa has significantly enhanced its healthcare programmes, and provides indigenous communities with access to crucial health services. The introduction of the ambulance has led to a decrease in fatalities and improved community members' access to healthcare services. During emergencies, community members now contact Lewa's radio room, demonstrating increased awareness of and trust in Lewa's ability to respond effectively to health-related issues.

In fulfilment of Lewa's commitment to improving community well-being, in 2023:

Lewa's ambulance evacuated **220** patients, addressing community health, maternal, accident-related and emergency needs

14,400 community members and **8,643** learners were engaged through Lewa's healthcare outreach programmes, improving community health education and awareness

2,754 patients received maternal and reproductive health services through Lewa Clinic's maternity wing

53,766 patients received medical attention at the four clinics supported by Lewa

SUSTAINABLE AGRICULTURE

COMMUNITY DEVELOPMENT

Lewa's Sustainable Agriculture Programme has established 11 demonstration plots in 6 community farms and 5 schools. These plots showcase modern farming techniques and alongside the training of 2,125 farmers, contribute to knowledge dissemination and skill development, potentially leading to improved household income.

Throughout 2023, Lewa collaborated with key partners, including AICCRA CIAT, the International Center for Tropical Agriculture, East African Seed Company, Syngenta, Bayer East Africa, Corteva, Agri-Farm, CKL Africa Limited, Agitech, and SoilCares to amplify its impact on farmers and community livelihoods through sustainable agriculture. By establishing partnerships, reinforcing stakeholder engagements, capacity building and providing farm inputs and market linkages, Lewa expanded opportunities for farmers and strengthened agriculture value chains.

To further support farmers, in 2023:

2,125 farmers were trained on modern farming techniques

1,214 farmers enrolled for agricultural training, showcasing Lewa's effectiveness in engaging local farmers to drive agricultural initiatives

11 demonstration plots (6 in the community, 5 in schools) were established

182 farmers went on Lewa-supported exposure tours, gaining knowledge and skills in innovative farming methods

302 farmers were connected to markets

402 soil tests were conducted on farms to increase their productivity

14 new partnerships were established, which provided farmers with farm inputs, training, knowledge-sharing opportunities and connections to markets, amplifying Lewa's impact

WATER MANAGEMENT

COMMUNITY DEVELOPMENT

The majority of the people living in the settlements surrounding Lewa depend on rivers and streams for water, which negatively impacts the fragile ecosystem. Proper resource management is paramount to ensuring the existence of a sufficient water supply that sustainably meets wildlife and communities' needs.

Lewa works with the national government through the Ministry of Water and Irrigation, water resource users associations and indigenous communities to identify solutions to water shortages and provide access to clean, safe water for domestic and livestock use.

To improve water supply in neighbouring communities, Lewa undertook the following initiatives in 2023:

Phase 1 of the construction of the **200,000 cubic metre Subuiga Dam** was completed, and with the onset of the rainy season, the Dam is full, significantly bolstering water availability in the region

1 new water project was established in Kithima kia Mugumo, bringing the total number of water projects implemented to **18**

3,478 water project members underwent training on sustainable water use, building their capacity in water resource management

35 water tanks were distributed to schools and farmers, encouraging guttering and facilitating rainwater harvesting

SECURITY

Maintaining world-class security operations remains a top priority for Lewa Wildlife Conservancy, a mission that is achievable through our strong partnership with the neighbouring communities, who play a vital role in our broader conservation efforts, ensuring the safety and well-being of the wildlife in our care.

To improve security in the Conservancy and its environs, in 2023:

89 rangers underwent training, enhancing their ability to capture data and monitor wildlife using EarthRanger applications

65 rangers underwent long-range radio technology training, and **9 rangers** were trained on enhanced radio communication and maintenance

6 rangers underwent refresher training in occupational first aid

12 rangers underwent tactical training, enhancing their security and wildlife management skills

35 rangers received snake awareness training, increasing their capacity to handle snake encounters

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ANTI-POACHING OPERATIONS

The Lewa-Borana landscape provides a secure habitat for many of the world's most vulnerable species, with Lewa serving as the central hub for security and wildlife monitoring across the region and the 45 community-owned member conservancies of the Northern Rangelands Trust.

Using real-time data from EarthRanger, a high-tech monitoring system, and working closely with the neighbouring communities, Lewa's world-class wildlife ranger and security teams not only conserve and protect the Conservancy's flora and fauna, but also enhance security for people in the region.

Lewa achieved the following wildlife protection milestones in 2023:

0 rhino poaching at Lewa

0 illegally killed elephants at Lewa

31 National Police Reservists underwent routine enhanced operations skills training and modern equipment provision

5 National Police Reservist drivers underwent skill-based training

6 National Police Reservist medic patrols underwent annual refresher training

SPECIAL PROJECTS

Lewa is globally recognised as a catalyst and model for endangered species management and community-centred conservation.

A pioneer of the conservancy movement in Kenya and beyond, Lewa regularly runs various special projects throughout the world, which improve species and rangeland health, and advance the frontiers of wildlife conservation.

In 2023, the Lewa-Borana landscape reached its capacity for rhinos. As one of the Conservancy's special projects, Lewa, in collaboration with the Kenya Wildlife Service, began plans to translocate rhinos in 2024 to various sanctuaries in other parts of the country, making a step forward in saving this endangered species.

Lewa is also an implementing partner of the Meru Bongo Rhino Conservation Trust, supporting the Trust in its plans to restore the mountain bongo to self-sustaining levels in the wild and improve the lives of communities and wildlife near Mount Kenya's forests, by airlifting 25 mountain bongos from the Rare Species Conservatory Foundation in Florida, in the United States of America (USA), to a sanctuary on the northern slopes of the Mount Kenya Forest Reserve. In phase 2 of the project, Lewa will provide support in reintroducing the black rhino to the same forest reserve.

Additionally, Lewa implemented the following special projects in 2023:

12 black rhinos were translocated to Loisaba Conservancy

4 white rhinos were translocated to Sera Community Conservancy

Established and officially opened the Mountain Bongo and Rhino Sanctuary

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FINANCIAL SUMMARY

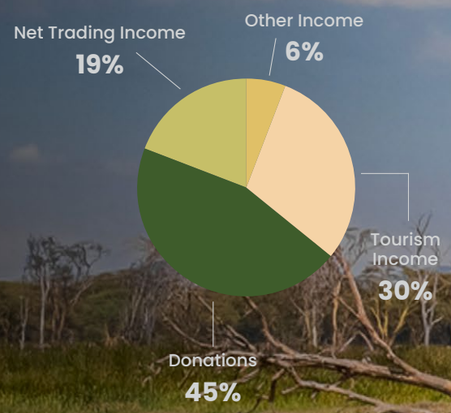
Global Revenue (USD)	**2022**	**2023**
Donations	3,728,028	3,042,533
Net Trading Income	860,667	1,304,571
Tourism Income	1,918,366	2,045,547
Other Income	147,649	405,490
Total Revenue	**6,654,708**	**6,798,141**

Global Expenditure (USD)	**2022**	**2023**
Programme Expenditure	4,161,018	4,329,678
Administration	1,571,899	1,518,289
Fundraising	173,783	188,477
Total Expenditure	**5,906,699**	**6,036,444**

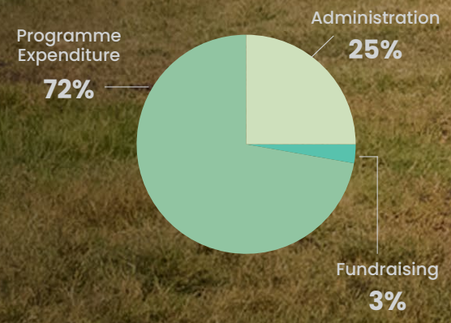
	2022	**2023**
Net Increase in Assets	**748,009**	**761,698**

These global consolidated financial figures are unaudited but are based on the audited or otherwise externally scrutinised financial statements of the Lewa Wildlife Conservancy organisations in Kenya, the United States of America, the United Kingdom and Canada.

Global 2023 Revenue



Global 2023 Expenditure



CONCLUSION

We envision a future where people across Kenya value, protect and benefit from wildlife. This future depends on communities being able to derive their day-to-day livelihoods in ways that are compatible with thriving wildlife habitats.

We will continue working to maximise the positive impacts of conservation within Lewa and neighbouring communities as we strive to advance community conservation best practices in Kenya and beyond.

Asante Sana!

The impact and milestones we achieved in 2023 would not have been possible without our global network of partners, donors, and supporters. Our deepest appreciation goes to each and every one of you.

In the last year, with you by our side, we made quantum leaps in conservation and community development. We are proud of the work we accomplished together and excited about the road ahead!

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GET INVOLVED

No Lewa project is successful in isolation. Lewa's 360 approach is an interwoven fabric of programmes, people and partnerships working together, that has enabled Lewa to achieve significant long-term results over nearly three decades.

Any unrestricted donation to Lewa is a gift to Lewa 360 and an investment in Lewa's overarching mission and model. Join us as a Lewa 360 donor, and your gift will be utilised by Lewa where your support is most urgently needed.

There are many impactful projects that you can support and various ways to give.
Check them all out here: **www.lewa.org/donate**

Say Hello

We would love to hear from you!

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Phone: (+254) 722 203 562/3

We are Social!

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Photography by Martin Buzora and Jeff DeKock

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Creating Hope from Uncertainty for Indonesia's Rhinos

Stacy Strother, International Rhino Foundation, s.strother@rhinos.org

For nearly three decades, the American Association of Zookeepers' Bowling for Rhinos program has provided essential funding for the protection of two of the world's most critically endangered mammal species - Javan and Sumatran rhinos. Despite the dedicated efforts of many in Indonesia and support from around the world, there is growing uncertainty about the population status of both species. Wild Sumatran rhinos seem to be disappearing as they are increasingly difficult to find and keep track of. Several Javan rhinos are missing from camera trap monitoring in Ujung Kulon National Park and for the first time in decades, rhino poaching has been confirmed in the Park. Today, there could be fewer than 100 Javan and Sumatran rhinos *combined*. But we haven't lost hope.

These species need our help now more than ever and we won't give up on them. Several phases of a comprehensive Integrated Protection System have already been implemented in Ujung Kulon, drastically reducing incursions and fortifying protection for Javan rhinos. The breeding program at the Sumatran Rhino Sanctuary has had inspiring success with two historic births last year and it could be the keystone to this species's future. Building on these successes, we are implementing new strategies, collaborating with effective organizations and investing even more resources and time to save these species from extinction. None of this would be possible without the support from AAZK's Bowling for Rhinos program and the tireless efforts of the keepers who drive it. You give us hope despite the uncertainties.

INTERNATIONAL RHINO FOUNDATION

2023 IMPACT REPORT

IMAGE COURTESY OF THE INDONESIAN MINISTRY OF ENVIRONMENT AND FORESTRY

2023 HIGHLIGHTS

2 CALVES BORN AT THE SUMATRAN RHINO SANCTUARY, NOW TOTALING 10 RHINO RESIDENTS

White rhino numbers increased for the 1st time since 2012 - in one year **white rhino populations across Africa grew 5.6% to an estimated total of 16,803.**

2,000 white rhinos from "World's Largest Rhino Farm" were acquired by African Parks to be rewilded throughout Africa over the next 10 years.

Zero reported rhino poaching losses in Zimbabwe's Lowveld Region for 1st time in over 20 years and the country's highest rhino population in 30+ years.

95% of IRF's funding went directly to rhino conservation programs throughout Africa and Asia.

COVER PHOTO COURTESY OF THE INDONESIAN MINISTRY OF ENVIRONMENT AND FORESTRY

IRF and the IUCN's African Rhino Specialist Group established the Rhino Range Expansion Fund to support essential needs for black and white rhino population management.

Thanks to an IRF-supported wildlife corridor, **at least 3 rhinos returned to India's Laokhowa Burhachapori Wildlife Sanctuaries for the 1st time in 40 years.**

IRF DISTRIBUTED:

31 CONSERVATION GRANTS

3 RHINO RANGE EXPANSION FUND GRANTS

9 RESEARCH GRANTS

IRF participated in the 3rd Asian Rhino Range Countries Meeting in Chitwan National Park, Nepal.

Education for Nature Vietnam, a longtime IRF partner, intervened for stricter sentencing in **5 rhino horn cases resulting in a combined 34 years of prison sentences for convicted criminals.**

VISION

A world where rhinos thrive in the wild.

MISSION

To ensure the survival of rhinos through strategic partnerships, targeted protection, and scientifically sound interventions.

HOW WE WORK

IRF is a funder and implementer of rhino conservation through in-country partners and staff. Our role is to amplify those working in rhino conservation and those living alongside rhinos by capacity sharing and skill building to enhance the impact of conservation programs in rhino range states.

IRF's Pillars

IRF's Pillars are our overarching focal areas that will enable us to move closer to accomplishing our mission.

Saving Rhinos

- **Protection:** Protect rhinos from poaching through a comprehensive, multi-layered approach that includes funding, technology, skills training and ranger support, as well as collaboration with law enforcement agencies and community stakeholders.
- **Demand Reduction:** Support techniques to reduce the demand for rhino horn and maximize penalties for its illegal possession and use.
- **Trafficking Disruption:** Disrupt wildlife trafficking networks by supporting research and analysis, intelligence gathering, investigations and wildlife crime prosecutions.
- **Population Management:** Increase and maintain healthy rhino populations at levels that can be sustained within each ecosystem in adequately secure areas of their historic range.

Engaging People

- **Connecting People for Conservation Action:** Unite and engage diverse audiences in meaningful conservation actions to protect rhinos and their habitats.
- **Community Development:** Partner with communities to create conservation awareness and sustainable natural resource management programs that ensure those who live alongside rhinos benefit from and support rhino conservation efforts.
- **Capacity Building:** Support, expand and share technical capacity to achieve locally-led, sustainable rhino conservation in Africa and Asia.
- **Advocacy to Support & Encourage Government Action:** Encourage and support government action for rhino conservation by helping to guide local, national, regional and international conservation policies and plans.
- **Organizational Health and Effectiveness:** Maintain The International Rhino Foundation's administrative, governance and financial robustness in order to unite around our shared vision and maximize results.

Protecting Habitats

- **Rhino Habitat Protection:** Protect the habitats that rhinos depend on to ensure the long-term survival of all five rhino species.
- **Rhino Habitat Expansion:** Expand small, isolated rhino habitats by building large, connected areas where rhino populations can grow and thrive and reintroduce rhinos into habitats from which they have been extirpated.
- **Rhino Habitat Restoration:** Recover degraded rhino habitats to recreate a functioning ecosystem for rhinos, other wildlife and people to benefit from.

Together, the International Rhino Foundation, our partners around the world and our growing network of supporters made a significant difference for rhinos in 2023. We are pleased to share some of the biggest news in rhino conservation, and the greatest achievements we made together in our 2023 Impact Report.

Poaching remains the most concerning threat to rhino populations in every corner of the globe. In 2023, one of IRF's on-the-ground partners discovered a poached rhino in Ujung Kulon National Park - the first evidence of Javan rhino poaching discovered in Indonesia in two decades. We are still learning the extent of the poaching activity - statements from individuals arrested for the crime included claims that as many as 26 Javan rhinos were poached between 2019 and 2023, a devastating and shocking number. If true, this could be as many as a third of the entire Javan rhino population. Thanks to a strong response by the Government of Indonesia, the investigation has led to the dismantling of several poaching groups, the arrest of several suspects and, in the first case to be tried as of this writing, one poacher convicted who received a 12-year prison sentence - a record for wildlife crime in Indonesia. This is a major setback for Javan rhinos, but we remain steadfast in our commitment to protecting this imperiled species while the population recovers. The rhinos know what to do - there has been at least one known calf born every year for the past 13 years in Ujung Kulon National Park, despite the poaching pressure.

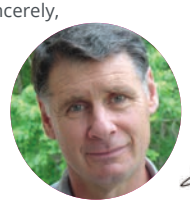
Indonesia's Sumatran rhinos had a historic year, with two births at the Sumatran Rhino Sanctuary. One calf, born to established breeders Ratu and Andalas, and the other from a newly established breeding pair, Delilah (who herself was born at the SRS in 2016) and Harapan. These special births give us tremendous hope for the future of this species and is a sign that we can save even the most imperiled wildlife if we are determined and resolute.

There was also good news for rhinos in Africa, with black rhino numbers increasing to almost 6,500, and the first population increase for white rhinos in a decade. An auction of 2,000 privately-owned white rhinos resulted in an enormous conservation opportunity, led by African Parks, to create and restore wild populations across the continent. IRF's partners in Zimbabwe report that there were zero rhinos poached in Bubye Valley Conservancy (BVC), where a key population of black rhino lives. This is a welcome reprieve from 2019, when BVC lost 55 rhinos - 20% of their population at the time - to poaching.

This year, IRF developed our 2024-2027 Strategic Plan, focusing on three key pillars that embody our work to ensure the survival of the world's rhinos: Saving Rhinos, Engaging People and Protecting Habitats. While we are a U.S.-based organization, our work is focused in rhino range countries to save rhinos, protect their habitats and engage the people who have the desire to be the greatest rhino allies. Complex threats, like poaching, require a multifaceted solution and we believe our work under these three pillars is the most comprehensive, impactful strategy to address the direct and indirect threats rhinos face.

From Africa to Asia, every rhino species has a unique set of conservation challenges based on the environmental, socioeconomic and political realities of the province and country they reside in. IRF works closely with our in-country partners to ensure our strategy for each species appropriately reflects these realities, the best available science and the resources available. We are also the common thread between many organizations, individuals and government agencies throughout the world who share our vision to see rhinos thrive in the wild. With your help, we are able to support and amplify the work done to protect the world's most critical rhino populations. Your support makes a tremendous impact for rhinos every day, and for that we thank you.

Sincerely,



JOHN LUKAS
President

NINA FASCIONE
Executive Director

STATE OF **THE RHINO**

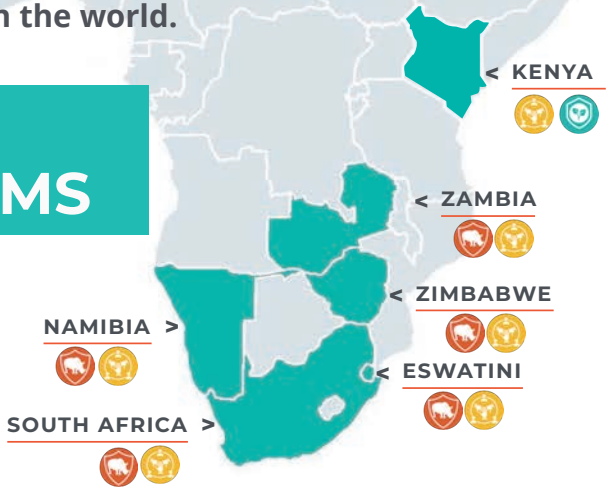
In 2023 we saw a continued shift in poaching patterns. In Africa, at least 566 rhinos were poached as poaching syndicates targeted smaller or less protected areas. After recording no rhino poaching incidents in 2022, India suffered two poaching losses in 2023. And Indonesia's Ujung Kulon National Park, home to the world's only population of Javan rhinos, saw an alarming increase in incursion attempts and confirmed rhino poaching for the first time in decades. Despite these tragic losses, updated estimates of black and white rhino populations.

There are now just over
27,000 rhinos left in the world.

WHITE RHINO
Ceratotherium simum
NEAR THREATENED
16,803
POPULATION DECREASING
LOCATED IN: SOUTH AFRICA, NAMIBIA, KENYA, ZIMBABWE, ZAMBIA, BOTSWANA, ESWATINI, MOZAMBIQUE

BLACK RHINO
Diceros bicornis
CRITICALLY ENDANGERED
6,487
POPULATION INCREASING
LOCATED IN: NAMIBIA, SOUTH AFRICA, KENYA, ZIMBABWE, TANZANIA, ZAMBIA, BOTSWANA, MALAWI, ESWATINI, RWANDA, MOZAMBIQUE, CHAD

2023 **PROGRAMS**



GREATER ONE-HORNED RHINO
Rhinoceros unicornis
VULNERABLE
4,014
POPULATION INCREASING
LOCATED IN: INDIA, NEPAL, BHUTAN

JAVAN RHINO
Rhinoceros sondaicus
CRITICALLY ENDANGERED
UNKNOWN*
POPULATION STABLE
LOCATED IN: INDONESIA

**The Asian Rhino Specialist Group's last population estimate was 76 Javan rhinos in 2022. The exact population is currently unclear due to the 2023 discovery of a poaching operation still under investigation, which may have killed as many as 26 rhinos.*

SUMATRAN RHINO
Dicerorhinus sumatrensis
CRITICALLY ENDANGERED
34-47
POPULATION DECREASING
LOCATED IN: INDONESIA

IRF FOCUSES PROGRAM SUPPORT IN THREE KEY PILLARS:

SAVING RHINOS

ENGAGING PEOPLE

PROTECTING HABITATS

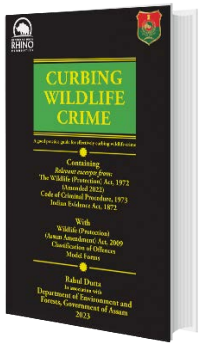
2023 PROGRAM UPDATES

HIGHLIGHTS FROM IRF PROGRAMS AND IRF-SUPPORTED PROJECTS AROUND THE WORLD

SPECIES:
GREATER ONE-HORNED RHINOS

REGION:
INDIA & NEPAL

460-PAGE WILDLIFE CRIME INVESTIGATION MANUAL PUBLISHED TO HELP RHINOS IN INDIA



This manual, created by the International Rhino Foundation's Intelligence Specialist, Rahul Dutta, was created for authorities in India to better understand and apply local laws when collecting evidence related to wildlife crimes. The manual aims to ensure any evidence collected is admissible in court and cannot be dismissed on procedural technicalities.


PHOTO: NATIONAL TRUST FOR NATURE CONSERVATION

60 COMMUNITY MEMBERS ENGAGED IN RHINO HABITAT WORK IN NEPAL

With support from IRF, National Trust for Nature Conservation (NTNC) is restoring and managing habitat for the world's second largest greater one-horned rhino population, found in Nepal's Chitwan National Park. NTNC currently manages 300 hectares of formerly degraded grasslands with the help of local community members living closest to the Park. Prioritizing the participation of marginalized groups, particularly women, creates opportunities for extra income as well as a lasting connection between people and their local ecosystems.

RHINOS RETURNED TO LAOKHOWA-BURHACHAPORI WILDLIFE SANCTUARIES FOR THE 1ST TIME IN 40 YEARS!

In December, 2023, two rhinos moved themselves from Orang National Park to Laokhowa-Burhachapori Wildlife Sanctuaries by using a newly established wildlife corridor created just for this purpose. The rhinos have remained in this new habitat, closely monitored by forest guards, and will be joined by more rhinos naturally and with wild-to-wild translocations from other areas. Increasing the protected habitat available to greater one-horned rhinos enhances gene flow between sub-populations, building an even larger and healthier species population. The corridor benefits all nearby wildlife, including endangered Bengal tigers which have been spotted using it as well.


PHOTO: AARANYAK

2 SQUARE KILOMETERS OF RHINO GRASSLAND HABITAT RESTORED IN MANAS NATIONAL PARK

Grassland management is critical for the greater one-horned rhino population to continue to grow. In India's Manas National Park, invasive plant species are hand-pulled and native woody trees, like *Bombax ceiba*, are girdled to prevent them from getting too large and shrinking the grassland habitat. More than 150 daily wages were provided to local community members to help with the habitat work, girdling 413 Bombax trees.


PHOTO: AARANYAK

68 FOREST OFFICERS RECEIVED SPECIALIZED WILDLIFE CRIME INVESTIGATION TRAINING

Hands-on wildlife crime training for new and experienced Forest Officers is in high demand throughout India. Led by IRF staff, these three-day interactive workshops on wildlife law, crime scene investigation, evidence collection and case preparation, are designed to lead to more successful prosecutions. With the recruitment of female forest officers increasing in India, 17 new female recruits received this specialized training in 2023.

2023 PROGRAM UPDATES

HIGHLIGHTS FROM IRF PROGRAMS AND IRF-SUPPORTED PROJECTS AROUND THE WORLD

SPECIES:

JAVAN & SUMATRAN RHINOS

MEET THE SUMATRAN RHINO SANCTUARY'S 2 NEWEST RHINOS

IRF PARTNER, YAYASAN BADAK INDONESIA (YABI) MANAGES THE SUMATRAN RHINO SANCTUARY IN WAY KAMBAS NATIONAL PARK

INDRA

- Indra, a male, was born on November 25, 2023 - at least 10 days earlier than expected. 1st-time mom Delilah gave birth without any human assistance.
- This was also the 1st successful breeding for father Harapan, who was born at the Cincinnati Zoo and Botanical Gardens in 2007.
- Delilah and Harapan are the third successful breeding pair at the SRS, joining Ratu & Andalas and last year's first-time parents, Rosa and Andatu.
- In addition to having the shortest recorded gestation, Delilah is also now the youngest Sumatran rhino to give birth in the breeding program.

ANGGI

- Anggi, a female, was born on September 30, 2023.
- This is the 3rd calf for parents Ratu and Andalas. Their first two calves were Andatu, born in 2012, and Delilah, born in 2016.
- Only 1 other captive pair of Sumatran rhinos have had at least 3 calves together - Andalas's parents Emi and Ipuh, at the Cincinnati Zoo and Botanical Gardens.

REGION:

INDONESIA

IRF FUNDED 4 WILDLIFE PROTECTION TEAMS (WPTS) IN SUMATRA'S LEUSER ECOSYSTEM

Forum Konservasi Leuser (FKL) managed 38 WPTs in 2023 to protect one of the last remaining habitats of wild Sumatran rhinos. Each WPT consists of 4 highly skilled FKL rangers and 1 government ranger personnel from the Integrated Forest Management Unit (KPH) authority.

PHOTO: INDONESIAN RHINO INITIATIVE

13 WOMEN FROM 2 VILLAGES SURROUNDING WAY KAMBAS NATIONAL PARK LEARN 'ECO-PRINTING' AS A LIVELIHOOD CRAFT

Eco-printing is a fabric-dyeing process that uses artistically arranged flowers and leaves to create naturally printed fabrics. A two-day training workshop hosted by IRF partner, Indonesian Rhino Initiative, aims to help generate a revenue source for the community while creating incentives for forest restoration and protection within Way Kambas National Park, home to numerous endangered species.

PHOTO: INDONESIAN RHINO INITIATIVE

3 REFORESTATION SITES GROWING IN WAY KAMBAS NATIONAL PARK

- **41** University of Lampung students conducted environmental research in Site One, Rawa Bunder.
- **20,000th** seedling milestone surpassed at Site Two, Rawa Kidang. From 2019 to 2023, a total of **21,870** seedlings have been planted at this site with an **83%** survival rate.
- **75** members of the Wana Bhakti farmers group assist with growing and planting seedlings, maintaining and preserving the restoration area in nearby Site Three, Simpang Rusa.

SIGNIFICANT ARREST MADE IN INDONESIA'S 1ST SUSPECTED JAVAN RHINO POACHING CASE IN DECADES

Camera traps installed to monitor the Javan rhino population in Ujung Kulon National Park caught evidence of a suspect* illegally in the Park carrying a firearm. This evidence helped lead to his subsequent arrest in November 2023.

**As of June 2024, the poacher was tried and convicted of illegally killing Javan rhinos, receiving a 12-year prison sentence. During his trial he testified to killing six Javan rhinos with his gang and selling their horns from 2019-2023. As of this writing, 14 more suspects related to this case have been arrested.*

A major investigation and response was launched by the National Park authorities, local police and national military to better secure the Javan rhino's only remaining habitat. IRF will continue supporting the Park and local implementing agencies in their efforts to improve security and investigate wildlife crime networks.

1 NEW JAVAN RHINO CALF MARKS 12TH YEAR IN A ROW FOR BIRTHS IN UJUNG KULON NATIONAL PARK

With all the world's Javan rhinos living in one location, the species is extremely susceptible to threats including potential inbreeding depression, natural disasters, disease and poaching. Despite these threats, Javan rhinos continue to breed successfully and at least one new calf has been recorded every year since 2012.

Images of Javan and Sumatran rhinos are courtesy of the Indonesian Ministry of Environment and Forestry

2023 PROGRAM UPDATES

HIGHLIGHTS FROM IRF PROGRAMS AND IRF-SUPPORTED PROJECTS AROUND THE WORLD

SPECIES:
BLACK & WHITE RHINOS

REGION:
SOUTHERN AFRICA


Photo: Save the Rhino Trust

7 NEW CONSERVATION JOBS CREATED IN NAMIBIA'S NYAE NYAE CONSERVANCY TO PROTECT BLACK RHINOS

Nyae Nyae Conservancy is home around 2,000 inhabitants who are mainly of the Ju|'hoansi ethnic group. This group is regarded as one of the most economically marginalized groups in Namibia. The creation of long-term conservation jobs for the Ju|'hoansi people, like Community Rhino Ranger jobs, will provide much-needed cash injections into their local economy.

IRF SUPPORTED 13 RANGER SALARIES IN ESWATINI'S BIG GAME PARKS (BGP)

Eswatini is a small landlocked country surrounded by some of the world's most active rhino poaching hotspots. Thanks to the dedicated work of BGP, there have been zero rhinos poached and no known poaching incursions in this important rhino population since 2017. Each BGP ranger supports an average of 7 family members, so 91 people were impacted directly by our support.

HONORING SIABUWA'S LEGACY - WHY EVERY RHINO COUNTS


Photo: Lowveld Rhino Trust (LRT)

Siabuwa recuperating from a gunshot wound Bubye Valley Conservancy in 2009

Sadly, 39-year-old black rhino cow Siabuwa passed away last year from natural causes in Bubye Valley. Siabuwa was one of the original Lowveld population founders, translocated to safety from the intense poaching in Zambezi Valley in 1992.

Thanks to the monitoring and care provided by LRT over her lifetime, Siabuwa survived being shot by poachers, went on to have 10 calves and lived to be one of the oldest rhinos in Zimbabwe. Her calves have produced 29 calves to date, and those calves have since produced 11 more. At least 50 BVC black rhinos - so far - can be traced back to Siabuwa. In 2021, her daughter Siashialaba was one of the rhinos translocated to establish a new population in Zimbabwe's Gonarezhou National Park.

Siabuwa's lineage - and legacy - will live on throughout Zimbabwe for generations to come.

18 BLACK AND 7 WHITE RHINO CALVES BORN IN ZIMBABWE'S BUBYE VALLEY CONSERVANCY

The Lowveld Rhino Trust (LRT) concentrates on rhino monitoring and management interventions in Bubye Valley Conservancy (BVC). With zero poaching incidents in 2023, BVC now has 226 black rhinos and 68 white rhinos making BVC the second largest contiguous black rhino population in the world! LRT conducted two routine management operations in BVC immobilizing 48 rhinos in 2023 and no emergency rhino interventions were required.


Photo: Stop Rhino Poaching

471 RANGERS AND MANAGERS FROM 46 RESERVES RECEIVED LEGAL TRAINING

IRF's core partner in South Africa, Stop Rhino Poaching, completed its third year of highly-requested Basic Legal Training workshops for rangers and reserve managers. This training aims to contribute to technicality-free arrests and convictions of rhino poachers to prevent them from returning to their crimes. Past participants have called it "the most important training" they have ever received.

2023 RHINO RESEARCH GRANTS

Undertaking both applied and basic research on wild rhino populations, as well as those in captive breeding programs, is an essential aspect of rhino conservation. The International Rhino Foundation (IRF), the only organization to provide funding strictly for rhino research, distributed nearly $300,000 in 2023 to fund nine worthy rhino studies. These grants targeted key areas that address some of the greatest challenges those working to conserve rhinos face in maintaining healthy, self-sustaining populations that will survive well into the future. Below is a summary of this round of grants, broken down by research area.

Development of Standardized and Consistent Reporting Mechanisms and Methodologies for Confirming Sumatran and Javan Rhino Species Population Sizes and their Dynamics

- Investigating the Genetic Profile of Javan Rhino Population in Ujung Kulon National Park.

Determination of the Conservation Value of Different Rhino Populations

- Genetic Diversity in Southern White Rhino (SWR) from the Munyawana Conservancy, and Optimal Composition of Founder Populations Established from this Resource.
- Examination of Parentage Among Black Rhinoceros to Inform Future Management Within Zimbabwe.
- Applied Conservation Research for Metapopulation Management Approaches of the Critically Endangered Black Rhino (*Diceros bicornis minor*) in South Africa.

Investigation of Critical Factors Affecting Health, Well-being and Reproduction, *ex situ*

- Proteome and Methylome Analyses of Peripheral Blood Mononuclear Cells for Assessing Immune Health in the Critically Endangered Black Rhinoceros (*Diceros bicornis*).
- Investigating the Genetic Profile of Captive Sumatran Rhino in Sumatran Rhino Sanctuary in Way Kambas generated by Whole Mitochondrion Sequencing to Support National Breeding Program and *In-Situ* Management.

Methods to Improve Rhino Population Monitoring and/or Tracking

- Further Developing Rhino Horn Pods for Improved Cost-effective Monitoring and Research of Dehorned Rhinos in the Munyawana Conservancy.

Technical Assessments to Inform Metapopulation Management

- Strengthening Management for the World's Largest Meta-population of Black Rhinos
- Establishing an Individual Genetic Value for Black and White Rhinoceros From Existing Genotyping Data to Support the Genetic Management of *In-Situ* Populations.

SPOLIGHT ISSUE

A BRIGHTER FUTURE FOR 2,000 RHINOS AND BEYOND

In 2023, the world waited and watched eagerly as the fate of 2,000 southern white rhinos was decided. After years of financial uncertainty, owner and founder of Platinum Rhino, John Hume, put the world's largest captive rhino breeding operation up for auction. Hume controversially bred hundreds of rhinos per year and harvested their horns, gambling that one day international horn trade would be legal and he would be able to sell their horns to cover their costs and make a sizable profit.

Without a way to legally sell rhino horn, the self-reported operating costs of $9,800 dollars per day was increasingly unsustainable, so Hume announced that he would sell his 21,000-acre property and all of his rhinos to the highest bidder in an online auction in May 2023. Behind the scenes, IRF and the entire rhino conservation community sprang into action to determine what could be done to prevent these rhinos - almost 15% of global white rhino population - from falling into the wrong hands. Many agreed that the best course of action was to persuade Hume to seek a rewilding option for the benefit of his rhinos and the species as a whole, instead of seeking the highest bid from someone who may not have rhinos' best interest in mind. The online auction came and went without any bids, which created an opening for a positive conservation outcome.

After months of uncertainty, encouraging news came in September, 2023 - that Hume had agreed to sell his land and his rhinos to African Parks so that they could return them to the wild. African Parks is a long-standing nonprofit conservation organization that manages 22 reserves across 12 African countries, making them ideal to lead this ambitious rewilding initiative.

ANY INTERNATIONAL TRADE OF RHINO HORN IS ILLEGAL

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) regulates the international trade of plants and animals and their parts, including rhino horn. Over the years, several member countries have proposed creating an international regulated trade system for rhino horn. These proposals have been consistently rejected by CITES due to the detrimental effect it could have on global rhino conservation by potentially increasing the demand for rhino horn, as well as creating confusion for law enforcement and legal loopholes for poached and trafficked rhino horn. No one knows for sure, but a legalized trade in rhino horn has the potential to greatly increase rhino poaching - and could wipe out entire species - so many rhino conservationists oppose it.

Formally known as "Rhino Rewild," African Parks will manage and protect the rhinos in their current location while strategically translocating 300 of them per year over the next 10 years. Some of the rhinos will be added to established populations, increasing genetic diversity, and some will create new populations, renewing ecosystems where rhinos once roamed.

While African Parks is uniquely fit to lead this initiative due to their experience and access to rhino appropriate landscapes across the continent, no one organization can do this alone. It will take active collaboration and planning with national and regional governments, private reserves, and rhino conservation organizations, like the International Rhino Foundation, to pull off one of the great rhino conservation success stories in human history, and African Parks welcomes that partnership.

IRF'S RHINO RANGE EXPANSION FUND

IRF believes that effective rhino conservation in Africa has mostly been achieved in larger areas where rhino populations can be built up and sustained at over 50 rhinos, under private management or under long-term co-management arrangements between private and state or provincial agencies. Strong collaboration and coordination with neighboring reserves is also key for successfully addressing security threats. Successful examples of large private or co-managed rhino conservation programs include private sanctuaries in Kenya, several African Parks projects, North Luangwa National Park in Zambia, larger South African private reserves, and the Lowveld Conservancies and Gonarezhou National Park in Zimbabwe.

IRF is supporting critical rhino populations and sites to help build additional large, successful and holistic conservation programs, like those listed above, by providing specialized technical support to address regional rhino conservation priorities. In early 2023, we launched our new Rhino Range Expansion Fund, in partnership with the IUCN/SSC African Rhino Specialist Group, to fund technical support, assessments and feasibility studies for rhino conservation needs, with a focus on restocking and reintroduction assessments.

In 2023, we funded three projects:

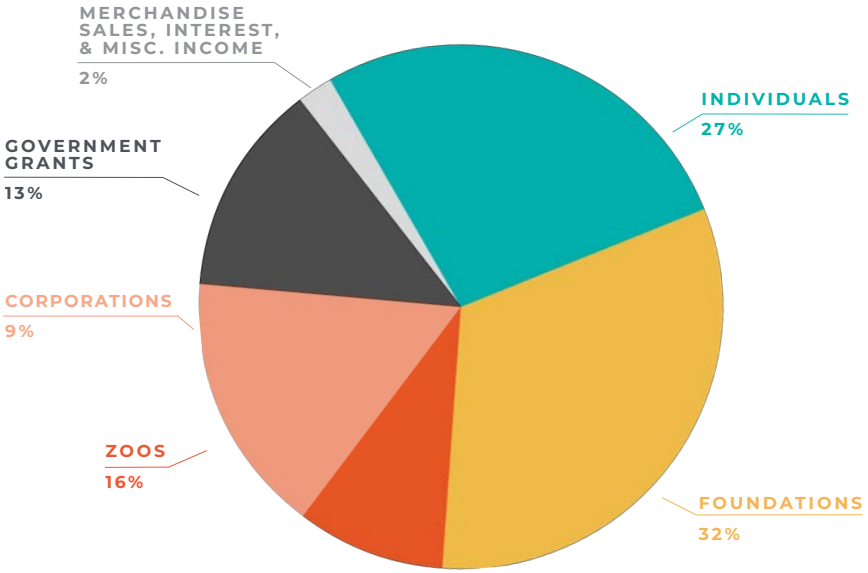
- An independent feasibility assessment for restocking black rhinos in Nsumbu National Park in Zambia (awarded to Frankfurt Zoological Society, Zambia)
- Development of a model for assessing habitats and ecological carrying capacity of rhino reserves in Kenya to aid in meta-population management (awarded to the Wildlife Research and Training Institute, Kenya).
- Development of a national rhino metapopulation plan for Zimbabwe (awarded to the Lowveld Rhino Trust, Zimbabwe).

The need for IRF's Rhino Range Expansion Fund grew significantly in 2023, thanks to African Parks' Rhino Rewild project and Kenya's ambitious plan to significantly increase rhino range in the Laikipia and Tsavo regions. IRF is working with with multiple private reserves in South Africa, our partners in Zimbabwe, Kenyan authorities and with African Parks to identify our strategic role with their range expansion and rewilding plans.

THE **FINANCIALS**

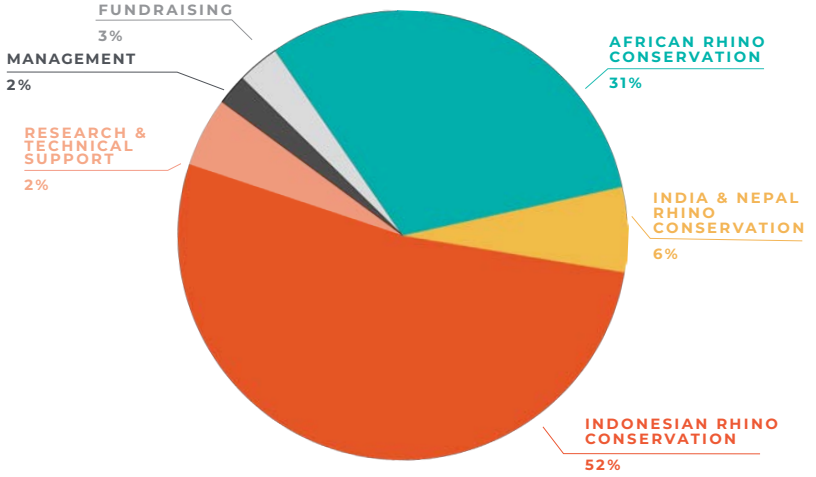
2023 REVENUE

INDIVIDUALS	$1,107,517
FOUNDATIONS	$1,321,100
CORPORATIONS	$372,922
ZOOS	$667,386
GOVERNMENT GRANTS	$526,909
TOTAL CONTRIBUTIONS	$3,995,834
MERCHANDISE SALES, NET	$10,398
INTEREST & MISC. INCOME	$96,699
TOTAL REVENUE	$4,102,931



2023 EXPENSES

AFRICAN RHINO CONSERVATION	$1,528,845
INDIA & NEPAL RHINO CONSERVATION	$310,933
INDONESIAN RHINO CONSERVATION	$2,524,256
RESEARCH & TECHNICAL SUPPORT	$253,496
TOTAL PROGRAM EXPENSES	$4,617,530
MANAGEMENT	$108,825
FUNDRAISING	$138,963
TOTAL ANNUAL EXPENSES	$4,865,318



For over three decades, IRF has strived to keep our operational costs low to maximize funding to conservation programs around the world. **In 2023, 95% of IRF's spending went directly to rhino conservation programs!**

TEAM RHINO SPOTLIGHT:
RHINORY AND MONTEREY ZOO

Corporate and zoo partners are vital to the success of the International Rhino Foundation's rhino conservation efforts.

In 2023, the Rhinory, an IRF corporate partner based in Texas, and the Monterey Zoo, a zoo partner based in California, independently hosted fundraising events to support our conservation programs. The events brought together more than 150 dedicated rhino supporters to hear from IRF's Indonesia Program Director, Sectionov (Inov). Inov shared stories about the challenges of protecting Javan and Sumatran rhinos and how IRF is working with local partners to ensure these species do not go extinct.

Cumulatively, the events raised more than $185,000 for rhino conservation – funds that are vital to ensure our rhino protection efforts continue.

We are so grateful to the Rhinory and Monterey Zoo for their dedication to rhinos!

If you or your organization would like to host an event for IRF, please contact m.parker@rhinos.org.

THANK YOU TO OUR DONORS

DEFENDERS $100,000 +

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Action for Cheetahs in Kenya: Bounty

Mary Wykstra, Action for Cheetahs in Kenya, mary.wykstra@actionforcheetahs.org

Action for Cheetahs in Kenya (ACK) is a community-based field conservation project under the umbrella of Carnivores, Livelihoods and Landscapes - a Kenya not-for-profit organization and a USA 501c3. Since 2010, ACK has received AAZK Bowling for Rhinos funds designated for activities primarily in the Samburu region. Field activities form the foundation for National Cheetah Survey methodology including outreach materials, survey techniques and the use of dogs as a tool for mapping the status and relationships of cheetahs on a range wide scale. In the past few years, ACK has published several manuscripts pertaining to the use of scat in evaluation of diet, health and genetics. Following the locusts of 2019, the pandemic of 2020 and the drought of 2021-2023, it has been amazing to watch the transition from the desert wind storms to the green pastures. Thanks to the work of ACK and partners in the pastoral communities, cheetah numbers are showing signs of increase. Communities far and wide seek advice from ACK staff members who now have adequate experience and materials to be such a great resource in cheetah conservation. BFR has been a consistent source of funding that enabled ACK to grow to where it is today, and can proudly share the story of cheetah conservation in Kenya.

Action for Cheetahs in Kenya: Bountiful
2024 AAZK BFR PRESENTATION

Mary Wykstra
Director, Action for Cheetahs in Kenya

Abstract: Action for Cheetahs in Kenya (ACK) is a community-based field conservation project under the umbrella of Carnivores, Livelihoods and Landscapes - a Kenya not-for-profit organization and a USA 501c3. Since 2010, ACK has received AAZK Bowling for Rhinos funds designated for activities primarily in the Samburu region. Field activities form the foundation for National Cheetah Survey methodology including outreach materials, survey techniques and the use of dogs as a tool for mapping the status and relationships of cheetahs on a range wide scale. In the past few years, ACK has published several manuscripts pertaining to the use of scat in evaluation of diet, health and genetics. Following the locusts of 2019, the pandemic of 2020 and the drought of 2021-2023, it has been amazing to watch the transition from the desert wind storms to the green pastures. Thanks to the work of ACK and partners in the pastoral communities, cheetah numbers are showing signs of increase. Communities far and wide seek advice from ACK staff members who now have adequate experience and materials to be a great resource in cheetah conservation. BFR has been a consistent source of funding that enabled ACK to grow to where it is today, and can proudly share the story of cheetah conservation in Kenya.

ACK projects range from foot patrols to camera trapping and from detection dogs to conflict mitigation. Each project has local participation, local expertise and partnerships, and produces results that are aimed at securing a future for cheetahs throughout their ecosystem.

As we approach 25 years of cheetah conservation in Kenya, we celebrate the contributions of organizations who provided financial and technical guidance. We also celebrate the bounty that abounds following successful rains that began in November 2023. The concept of “bounty” in relationship to the cheetah emphasizes the importance of a healthy ecosystem and the challenges cheetah face in surviving in the wild. Bountiful areas provide crucial habitats and prey for cheetahs, allowing them to maintain healthy populations. Bounty can refer to hunting success for the cheetah – adequate food for the cheetah and if it is a mother, for her cubs. Environmental bounty is the abundance of prey. Now more than ever before collaborative actions are needed to save the remaining cheetahs not only in Kenya, but throughout their range across Africa and Asia!

Action for Cheetahs in Kenya (ACK) has received AAZK Bowling for Rhinos funds since 2010. Funds are used to develop research programs and community outreach that support ACK in assuring the security of cheetahs on a range wide scale. BFR is a consistent source of funding enabling ACK to grow support research, build capacity and empower community conservation activities. BFR funds support staff, students and the community in the quest to provide a secure and sustainable future where cheetahs are free to roam the land. Shifts in land-use including infrastructure development, climate change and illegal trade are the greatest threats to cheetah sustainability. To mitigate the impacts of the threats includes the development of science-based solutions in collaboration with the national government (Kenya Wildlife Service (KWS) and the Wildlife Research and Training Institute (WRTI)), community conservation managers and conservation partners to develop plans for improved connectivity – including community conservation land set aside for minimal or no livestock grazing and void of settlement. ACK research involves data collection, analysis and solutions for sustainable carnivore populations. ACK staff are members of the Global Cheetah Forum, KWS Large Carnivore Technical Committee, LIS Carnivore Working Group (Laikipia, Isiolo, Samburu), Green Technical Committee (sustainable infrastructure development) and the Ewaso Forum Alliance.

Year	Amount	YTD
2010	$7,650	
2011	$7,313	$14,963
2012	$9,201	$24,164
2013	$13,707	$37,871
2014	$19,138	$57,009
2015	$44,363	$101,372
2016	$45,517	$146,889
2017	$45,571	$192,460
2018	$46,168	$238,628
2019	$45,388	$284,016
2020	$17,379	$301,395
2021	$22,060	$323,456
2022	$24,374	$347,830
2023	$25,039	$372,869

To date ACK has benefited to the tune of over $370,000 on BFR contributions. Various AAZK chapters have contributed additional funds directly, and more than 20 staff members from 15 affiliated organizaitons have participated in ACK projects as volunteers, board members and employees since 2010.

Global Cheetah Forum: Led by the Cheetah Conservation Fund, the first meeting was held in Ethiopia in January 2024. Following presentations on regional and international cheetah status and research the group formed a declaration committing to decision making for the long-term sustainability of cheetahs. At some point in the near future tough decisions will need to be made regarding small populations in countries where cheetah number have dropped below the minimal threshold. To assure conservation investment is result driven several technical committees were formed including the following Working Groups*: Populations and Distributions, Cheetahs and Communities, Human Cheetah Conflict, Rangewide Strategies, Capacity and Training, Illegal Trade, Translocation, Small Populations, Government Ambassadors, and Big Funding*

KWS Large Carnivore Technical Committee: The Kenya Wildilfe Service is the government appointed agency responsible for wildlife management in Kenya. In recognition of the need for range-wide partnership with permitted research and species expertise, KWS formed a technical

committee to discuss issues regarding policies related to human-carnvore conflict. Man of the issues discussed in the forum relate to the issues being discussed in the global working groups, thus working with these groups simultaneously are beneficial to cheetahs on regional and global scales.

LIS Carnivore Working Group (Laikipia, Isiolo, Samburu): Wildlife do not recognize the county boundaries, and with the LIS region hosting one of the most diverse population of wildlife, this group seeds to find consistency in conflict mitigation and predator management policies. By working in these three forums, ACK is able to contribute to the decision making from the ground level to the highest international policies.

Green Technical Committee: Sustainable infrastructure development is needed for long-term connectivity across Kenya. his technical group was formed out of the need to address wildlife connectivity in light of major development of roads, railway, pipeline and power lines in northern Kenya in line with Kenya's 2030 development plan. The Lamu Port South Sudan Ethiopia Transport (LAPSSET) Corridor Project focuses on inter-connecting the East African countries of Kenya, Ethiopia, South Sudan, and Uganda amongst others. While the plan has great economic potential in eastern Africa, it lacked technical input on impacts of the environment and wildlife. In many cases, it also lacked indigenous input regarding impact on pastoral practices. The GCT aims to integrate science based decision making into LAPSSET planning to improve sustainability and reduce impact on wildlife conflicts and mortalities.

Ewaso Forum Alliance – This alliance is the integration of national and county government with tourism, conservancy management, park management and conservation from Isiolo and Samburu counties including Shaba, Buffalo Springs and Samburu National Parks and surrounding community land. Issues facing conservation management include conflict over land and resources that often result in misunderstandings and conflict. The EFA group hope to pre-empt any future conflicts that might reduce tourism revenue or negatively impact livelihoods. The involvement of research organizations assists in science based management decisions.

Through our successful team and our partners, we are currently implementing multiple programs including the following:

- Expanding our Conflict Mitigation Toolkit into other conservancies and community areas surrounding National Parks and Reserves by developing train-the-trainer materials.
- Implementation of range wide monitoring methods including Scat Dogs, expert and community interviews and development of a national repository for cheetah geo-data.
- Establishing methods for mapping cheetah pedigree in collaboration with the Kenya Wildlife Research and Training Institute, the Mara-Meru Cheetah Project and Cheetah Conservation Fund.
- Growth of Herder Classes, Taka-taka project and International Cheetah Day projects to enhance awareness and tolerance for cheetahs in the Meibae Community Conservancy.
- Continued disease monitoring through rabies and distemper sampling linked to vaccination and sterilizations campaigns in partnership with the Kenya Society for the Protection of Animals and the International Livestock Research Institute.
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ACK is grateful to the support of Bowling for Rhinos and the other institutions, including several AAZK chapters. We are grateful for the opportunities to share our work and our experience in forums like the Zoo's and Aquarium's Committing to Conservation, visiting Colorado State University Study Abroad and Adventure Safari Groups led by Sandiego Zoo Keeper, Jessica Watters. For more information on getting involved with ACK projects, please visit www.actionforcheetahs.org.

ACK staff members participate in conferences and seminars that help gain support and promote awareness of cheetah conservation on a global scale. To enhance capacity in our team and in local and international students we host student and adventure safari groups at our Samburu Field Site

AUTHOR BIOGRAPHY

Mary Wykstra initiated cheetah research and community development programs in Kenya in 2001. Mary completed her undergraduate BSc at Michigan State University, and her Master of Environmental Management at Yale School of Forestry and Environmental Studies. Mary's projects work in affiliation with the Kenya Wildlife Service, Cheetah Conservation Fund and the University of Nairobi. She has empowered more than 100 local and international students through projects in affiliation with ACK. She manages a staff of over 25 people and 4 detection dogs to address conflict and corridor conservation issues facing cheetahs on a range wide scale.

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We Grow with Rhino Conservation

Frank Verney, AAZK Bowling for Rhinos Program, bfr@aazk.org

One of the main core components of Bowling for Rhinos (BFR) is the connection between chapters hosting events and the success in the field for rhino conservation. Over the past 34 years, we have seen both highs and lows across the globe for conservation of all species; however, there is always hope. The Bowling for Rhinos Committee is excited to share unique fundraising events by your fellow colleagues, strategies for a successful event, and highlights from the field for this past year.

Let's work together to grow our Bowling for Rhinos events by using the 5 Rhino R's; reach, rethink, restore, reclaim, and research. Reach out to corporate sponsors for support, rethink your educational campaigns, restore your community involvement, reclaim your social media engagement, and research your partnerships before agreeing to work together. By implementing these easy steps into your BFR event we hope you can have a stress free, successful event.
Chapters had a wildly successful BFR season in 2023 with funding helping support major projects with our Conservation Partners; Lewa Wildlife Conservancy, International Rhino Foundation and Action for Cheetahs in Kenya. The BFR team hopes these stories of Chapter and Conservation Partner success inspire you to collaborate with your fellow colleagues to raise more funds for rhino conservation.

Together We Grow Through Bowling for Rhinos

Frank Verney

BFR Program Manager

Bowling for Rhinos (BFR), spearheaded by the American Association of Zoo Keepers (AAZK), uses the simple and enjoyable activity of bowling to raise funds and awareness for the plight of rhinos worldwide. The concept underscores the idea that collective efforts can significantly contribute to global conservation efforts through seemingly unrelated activities like bowling. One of the main core components of BFR is the connection between chapters hosting events and the success in the field for rhino conservation. The BFR Committee is excited to share unique fundraising events by your fellow colleagues, strategies for a successful event, and highlights from the field from this past year.

Brevard AAZK hosts a mini-golf event every year called Putting for Rhinos, which is entering its 10th year! From Brevard AAZK Chapter: We partner with a local mini-golf course, who has also added go-karts in the last few years. The facility does not charge us any fees, allows us to use event space to set up a raffle, allows us to advertise on site, and donates 50% of all golf and go-kart proceeds to us during the event. We seek sponsorships from other small businesses in the community as well, and give them space to advertise at the event and on our flyers in exchange for monetary and in-kind donations. In-kind donations are used in a raffle and online silent auction during the event. Throughout the 36 holes of putt-putt, we set up signs for our sponsors' logos and for fun facts about rhinos. This enables us to not only support our sponsors, but also bring a touch of conservation education to our attendees. The majority of participants are not affiliated with our host zoo, but rather saw our advertisements for the event or just happened to walk in that night and participate. This increases our audience and hopefully inspires more people to care about rhinos. Over the years, we have built such a relationship with the mini-golf course, as well as our community sponsors, that they look forward to seeing us every year. There is now even a rhino statue on the course!

AAZK Chapter at Lion Country Safari hosts Bowling for Rhinos and Winos for Rhinos. Their BFR event is hosted at Greenacres Bowling, with guests getting two hours of bowling, pizza, and a soft drink. The chapter also sells merchandise they have and hosts a silent auction. Lion

Country Safari AAZK will be hosting their 22nd BFR event this year. They also host a Winos for Rhinos event which is entering its 3rd year. This event consists of a sit down dinner with 4 wine pairings and presentations from the AAZK officers relating to rhino conservation.

One of the ways the BFR Committee hopes to help fellow chapters is with successful strategies to increase your community involvement and hitting your target fundraising goal. Named in part after the 5 rhino species, the BFR Committee created the 5 Rhino R's; Reach, Rethink, Restore, Reclaim, and Research to help you have a successful event.

Reach:

We begin with the first R which is reach. One way you can help raise money for your Bowling for Rhinos event is to reach out in your community for local sponsors. By obtaining sponsorships, chapters are able to offset costs associated with hosting an event. If you have a hard time getting corporate sponsors, the BFR Committee has templates on how to get sponsors in the BFR event kit.

Rethink:

Rethink the way you promoted and planned your Bowling for Rhinos event in the past. Create a pros and cons list of how the event went and see what didn't work and try something different. For example, use social media to create an event page, create flyers and pass out to local businesses, and invite coworkers to your event.

Restore:

Restore your community involvement. Community engagement is a cornerstone of Bowling for Rhinos. The program's success is driven by the active participation of local communities, who come together to support a common cause. This sense of unity and shared purpose is amplified through the educational components of BFR events. Participants learn about the ecological importance of rhinos, the threats they face, and how conservation efforts are making a difference. In addition to direct conservation efforts, BFR also fosters a sense of global community and shared responsibility for wildlife conservation. By involving people in fun and engaging

activities, the program raises awareness about the plight of rhinos and inspires individuals to take further action in support of conservation. This dual impact – financial support and heightened awareness – is a key strength of Bowling for Rhinos.

Reclaim:

Reclaiming your social media engagement is a key tool in promoting your BFR event. In the past we had limited social media outlets, and BFR events were spread through word of mouth. There are a variety of social media tools at your disposal to help you promote your event and create engaging content. Facebook and email are still key components to creating a main page for your event but the use of Instagram stories and countdowns can also be helpful. Canva is an excellent tool to use to help your chapter create engaging content that can be cross posted over multiple social media tools. Educational outreach extends beyond the bowling alley. Many AAZK chapters collaborate with schools, businesses, and other organizations to spread the message of rhino conservation. These partnerships help to broaden the reach of the program and engage a wider audience. By fostering a culture of conservation-mindedness, Bowling for Rhinos contributes to long-term behavioral change and a greater commitment to protecting endangered species.

Research:

The final R is research. Make sure to research the partnerships you create for your BFR event. It is important that these partnerships align with your BFR event vision. Creating partnerships will help bring in more funds for Bowling for Rhinos. The funds raised can also support scientific research on rhino biology, behavior, and ecology. This research is critical for developing effective conservation strategies and understanding the needs of rhino populations.

It is the BFR Committees hope that by utilizing the 5 R's your chapter is able to host a fun, engaging and successful event. All the funds raised through these Bowling for Rhinos events help support our three conservation organizations: Lewa Wildlife Conservancy in Kenya, the International Rhino Foundation in Indonesia, and Action for Cheetahs in Kenya. These organizations work tirelessly to protect rhino habitats, combat poaching, and support local community space to ensure sustainable conservation practices. By hosting and participating in

BFR events, communities across North America contribute directly to these efforts, showcasing the power of collective action. Lewa Wildlife Conservancy uses BFR funds to maintain a robust anti-poaching team, which has been instrumental in reducing poaching incidents in the region. Similarly, the International Rhino Foundation utilizes these funds to support habitat protection and rhino monitoring programs in Indonesia, helping to safeguard the critically endangered Sumatran rhino. Action for Cheetahs in Kenya uses funds raised by BFR events to help support their scat tracking dogs and community vaccination clinics for dogs and cats.

"Together We Grow Through Bowling for Rhinos" exemplifies how community-based initiatives can drive significant positive change in global conservation efforts. By transforming a simple recreational activity into a powerful fundraising tool, BFR has raised millions of dollars for rhino conservation and inspired countless individuals to join the fight against extinction. The program’s success underscores the importance of collective action and the potential for communities to make a meaningful impact on the world’s most pressing environmental challenges. Through continued support and engagement, Bowling for Rhinos will undoubtedly continue to play a vital role in ensuring the survival of rhinos for generations to come.

15 Fun Facts: Celebrating 15 Years of Tree for You and Me

Cindy Roberts, AAZK Trees for You and Me Program, tfym@aazk.org

Join us as we celebrate 15 years of Trees for You and Me (TFYM). Learn 15 fun facts about how this grassroots program has gone global with raising funds to provide grants to non-profit organizations. These international projects focus on forest rehabilitation and combating climate change. To date chapters have raised over $200,000.00 which has provided grants for forest reforestation. These funds not only combat climate change that protects polar bear habitat, but also seeks to protect habitat for a variety of other species worldwide.

Celebrate TFYM and their successful grant program by learning about some of the projects that have received funds allocated by a TFYM grant. Some of the organizations include Save the Golden Lion Tamarins, International Rhino Foundation, and Planet Madagascar. Learn about the impressive and inspirational work the TFYM Grant recipients have done by planting trees, creating jobs, and supporting local economies. Then, learn how you can get involved with fundraising efforts.

We conclude our celebration by congratulating our TFYM Program Committee on the great work they have done to build this organization. A very special thank you to founder Christy Mazrimas-Ott and her dedication and passion for 15 great years of rebuilding our world's forests while protecting polar bears and other species for generations to come.

Celebrating 15 Years of Trees for You and Me with 15 Fun Facts

Cindy Roberts
Conference Liaison, Trees for You and Me
Tacoma, Washington

Join us as we celebrate 15 years of the American Association of Zookeepers (AAZK) Trees for You and Me (TFYM) program. AAZK TFYM grassroots program has gone from providing funds for local communities to providing grants to international non-profit organizations. These projects focus on forest rehabilitation and combating climate change. Learn more about this amazing program and how you can participate with 15 fun facts celebrating 15 years of AAZK TFYM.

Fact 1. AAZK's TFYM program was founded by Christy Mazrimas-Ott, the Program Manager. This grass roots program started back in 2009 with the goal of raising funds to plant trees to combat climate change and protect polar bears.

Fact 2. In 2009, TFYM began raising funds, with the help of local AAZK chapters, to plant trees in parks and communities, both locally and nationally. With those funds, trees were planted in state parks including Florida, Michigan, and Wisconsin, just to name a few.

Fact 3. Why plant trees? According to the Arbor Day Foundation, in one year a mature tree will absorb more than 48 pounds of carbon dioxide from the atmosphere and release oxygen in exchange. Trees are an important element in combating climate change. Every time we use coal, oil or natural gas it releases excess carbon dioxide (CO_2) into the atmosphere and creates a heat trapping blanket. The rampant CO_2 is warming the earth and melting sea ice. Sea ice is imperative for polar bears that rely on the ice as their hunting platform. The sea ice is important for polar bears but it also helps to cool the earth for all of us.

Fact 4. In 2016, the TFYM program went worldwide and transitioned to providing grant opportunities for recipients locally, nationally, and internationally. Non-profit organizations from all over the world are eligible to apply for a grant to help not only polar bears, but species all over the world that are being impacted by deforestation and climate change. In addition, these efforts have helped to support local economies, provide jobs and create a healthier earth for all of us.

Fact 5. It is easy for anyone to apply for the TFYM grant. On the AAZK website under the TFYM tab you can find a link to the grant along with the submission guidelines. The grant provides funds to both US and International non-profit organizations that use the funds for projects related to habitat restoration and combating climate change. The TFYM grant is open to any organization, even outside of AAZK, that is associated with a United States entity and can be for any sized project. Do you know of an organization that could use a grant for the great work they are doing?

Fact 6. The Wilds, located in Ohio, is a free roaming park for threatened and endangered species and is the largest conservation center in the world. Part of their conservation effort is studying ecological recovery and restoration. Restoration of the Wilds tried an experimental planting method after having little success in replanting due to residual effects of mining and heavy competition with grasses among other challenges. The Wilds planted over 3,000 seedlings across 5 acres trying to determine the best methods to plant trees. They tried two different methods of preparing the soils and also experimented with using tubes to help tree growth. The results from this project will determine how they restore habitats in the future. TFYM is proud to have funded this project that could change forest rehabilitation in the future.

Fact 7. Planet Madagascar received the TFYM grant in 20222 and helped restore forests to save Lemurs in Madagascar. The funding that they received supported their work and was used to grow 3,000 seedlings from the local women's cooperative which made more seedlings for forest restoration and contributing to the conservation economy. In addition, the TFYM funds supported their efforts in planting 3,012 seedings, covering 2.71 hectares. The funds helped to purchase seedlings for planting, compost, hiring zebu carts to transport the compost and seedlings for planting and salaries for the planting supervisors and team.

Fact 8. The International Rhino Foundation (IRF), received the TFYM grant in 2020 and 2023 and is restoring habitats in Way Kambas National Park, Bogor, Indonesia. This park is home to many species including Sumatran elephants, tigers and rhinos. Sumatran rhinos are on the verge of extinction and restoring the forest is critical for their survival. TFYM funds helped to plant new seedlings and assigned four permanent rangers to protect the rhinos from poachers while overseeing reforestation efforts. In addition, IRF partnered with local schools to provide education, teaching students about local forests, wildlife, and the importance of protecting them. The students gain hands-on experience planting and growing seedlings. TFYM grants help in so many ways all over the world.

Fact 9. Did you know you can nominate one of your chapter members to win a trip to Canada? By raising funds for TFYM, your chapter is able to nominate a member to win an opportunity to go to Churchill, Manitoba, the Polar Bear Capital of the World, with Polar Bears International where they will be a participant in the Climate Alliance Program. The trip winner will get to go out on the Frontiers North Tundra Buggy on the Arctic Tundra and see a variety of species in the wild, including polar bears During this trip, the winner will learn about polar bears, the impact of climate change, and how to utilize strategic framing to communicate ways to protect polar bears in the Arctic home. They will also get to meet the people of the Arctic, make new friends, and become a part of the Polar Bears International Climate Alliance family.

Fact 10. If your AAZK Chapter donates to TFYM between January 1st and November 1st every $100 you donate gets your chapter one ticket into the drawing . TFYM also holds the TREEBLITZ, from February 1st through April 1st. During TREEBLITZ, Chapters receive double the tickets up to $500. This means that you can get 10 tickets for your AAZK chapter to have a chance to send one of your members on the expedition of a lifetime. The winning chapter will nominate a member to go. Start planning your fundraising events now so you can donate and have the chance at a life changing experience. Some examples of fundraising include garage sales, trivia nights or parties at local breweries.

Fact 11. TFYM has provided $134,608.31 to TFYM grant recipients since 2016. In 15 years they have raised $214,149.47 to rehabilitate habitats, reforestation and combating climate change. In 2023, TFYM awarded $24,279.26 for grants. The International Rhino Foundation, "Protecting Sumatran Rhinos through Reforestation Efforts in Way Kambas National Park", received $15,000.00. Zoo Outreach Organisation, received $9,279.26 for their project "Trophic rewilding to enhance Ecology-Based Climate Resilience in Western Himalaya". We hope you will join us in our fundraising efforts to help continue the great work of these organizations focused on reforestation efforts.

Fact 12. This program was made possible with the support of Polar Bears International and local AAZK chapters. Polar Bears International has supported TFYM by matching funds raised to plant trees. In addition, as incentive for local chapters to raise funds for TFYM, PBI generously provides a spot in their Climate Alliance Trip to the Polar Bear Capital of the World in Churchill, Manitoba, Canada. Local AAZK Chapters organize events and fundraisers and donate the proceeds to TFYM. These fundraising efforts go directly into the TFYM grant which provides funds for habitat restoration and reforestation. TFYM would not be able to do what they do without the support of PBI and local AAZK chapters.

Fact 13. The TFYM Program is made possible because of the hard work and dedication of our committee members who donate their personal time to raise funds, facilitate the TFYM Grant, and raise awareness for this great cause.

Fact 14. TFYM is the only AAZK Program/committee that has their own Bonfire merchandise store. You will find all of our past designs in many styles and colors to choose from. This year we have Special Edition Artwork, created by Peppermint Narwhal, commemorating 15 years of planting trees and saving species all over the world.Go to https://www.bonfire.com/store/aazk-trees-for-you-and-me-program/ to purchase merchandise with a portion of the proceeds going to the TFYM program.

Fact 15. You can learn more about donating, organizing a fundraiser with your local chapter, and applying for a TFYM Grant by going to our website at https://aazk.org/committee/trees-for-you-and-me/. You can also contact us directly at tfym@aazk.org.

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Conservation, Collaboration, and Community

David Johnson, Katie Adamson Conservation Fund, dave.johnson@katieadamson.org

The Katie Adamson Conservation Fund (KACF) is dedicated to global biodiversity conservation efforts, leveraging partnerships and community engagement to achieve tangible conservation outcomes. Founded by former Denver Zookeeper, Dave Johnson, KACF empowers individuals and organizations to make a meaningful impact on wildlife conservation worldwide.

Through strategic initiatives spanning diverse ecosystems, KACF collaborates with local communities, scientists, and conservationists to address pressing conservation challenges. From the jaguars of Costa Rica to the rhinos of Africa, KACF's efforts span continents and species, fostering a holistic approach to conservation.

One of KACF's primary objectives is to engage zookeepers from the United States in conservation trips, providing them with firsthand experience in wildlife conservation efforts abroad. By immersing zookeepers in conservation initiatives, KACF aims to bridge the gap between captive animal care and field conservation, fostering a deeper understanding of conservation challenges and solutions.

In addition to conservation expeditions, KACF hosts educational programs and community outreach events to raise awareness about the importance of wildlife conservation. By inspiring and empowering individuals to become conservation advocates, KACF cultivates a global network of conservation champions committed to safeguarding our planet's biodiversity.

Join us at the AAZK conference to learn more about KACF's impactful initiatives and discover how you can become involved in our efforts to protect and preserve the world's wildlife. Together, we can make a difference for the future of our planet.

The Katie Adamson Conservation Fund: A Decade of Global Impact

Introduction

The Katie Adamson Conservation Fund (KACF), founded in honor of Katie Adamson, is dedicated to wildlife conservation and community sustainability worldwide. Losing Katie to childhood cancer back in 2014, led to this amazing collaboration to keep her spirit and dreams alive. She was a zoo teen volunteer, explorer scout, and intern at the Denver Zoo for twelve years. Her dreams of becoming a zookeeper were sadly cut short while still working on her wildlife biology degree up at Colorado State University. Under the passionate leadership of Executive Director Dave Johnson, the KACF has flourished, establishing vital partnerships with zoos, zookeepers, and conservation organizations globally. Now the KACF has an impact in 32 countries and has raised almost four million dollars to help protect species around our planet. Dave retired from zookeeping last summer to run this organization full time and create a conservation fusion with global stakeholders. It was time to make a bigger impact.

Dave Johnson: A Lifelong Commitment to Conservation

Dave Johnson, affectionately known as Mr. Dave to his community, has dedicated his life to conservation. With 25 years of experience as a zookeeper at the Denver Zoo, specializing in pachyderms, Dave brings a wealth of knowledge and passion to his role at KACF. His profound connection with animals and his commitment to their preservation drive the organization's success. Dave got a wildlife biology degree from UNC-Chapel Hill in 1990. He has worked with the Bureau of Land Management in Alaska as a bear biologist, been a conservation educator at the Salato Wildlife Education Center in Kentucky and spent his formative years working at animal facilities in the Carolinas. Now he can devote his efforts to conservation and community while mentoring the next generation of animal nerds.

Global Conservation Initiatives

Nepal

This was the first country that brought this team abroad. In 2010, Dave led his first excursion with zoo staff and volunteers to highlight the opening of Toyota Elephant Passage and the zoo's efforts to showcase Asian elephant bulls and the greater one-horned rhino. This was the first time this rhino had been in Colorado, and it was their first taste of conservation abroad. This ended up being a contagious action. This led the team to annual visits to promote collaboration and community. They were asked to partner with the Chepang people, who were considered prime rhino poachers, with an average of almost 12 rhino being killed annually in Chitwan National Park. After fences, beehives, educational support, and yearly visits the poaching rate dropped to one rhino poached every other year. The next steps were to build the people a wildlife veterinary hospital in Sauraha that would help all the species in the park and be a symbol of pride for the surrounding villages. After five years of fundraising and construction, the new vet hospital opened in 2021. Now it has wildlife murals painted on it and the team established an annual elephant health camp with the National Trust for Nature Conservation (NTNC). KACF's efforts in Nepal focus on protecting other endangered species like the snow leopard, gharial, and the red panda. They also support the work of tiger, leopard, and hornbill biologists who are studying their backyard wildlife and getting degrees

to become the next major conservationists of Nepal. Mr. Dave has been to Nepal now 13 times and taken over 200 people with him on these excursions, including zookeepers and zoo volunteers from around the US. They also now have a person doing conservation honey and human/wildlife conflict mitigation in Bardia National Park that gets a working stipend to lead his community. Nirajan Chhetri just visited the US for the first time to learn more about beekeeping and visit his KACF family. He has continued the efforts with the families that have lost members to wildlife by supporting them with beehives and educational support for their children. Working closely with local communities, the organization continues to promote sustainable practices that benefit both wildlife and people in Nepal. They will return in November with a team from all corners of the nation to do the elephant health camp. Last year they got to look at 61 working elephants providing health care, exams, vaccinations, and foot work by their team of vets, vet techs, zookeepers and farriers.

Costa Rica

In Costa Rica, KACF works with a multitude of taxa and the people who want to see them survive. Their first partnership addressed jaguar conservation with dedicated scientists, aiming to mitigate human-wildlife conflict and promote coexistence. They teamed up with Dr. Eduardo Carrillo and his three PhD candidates who had studies going on with jaguar populations all around the country. The KACF helped with education, radio-telemetry collaring, and predator/prey studies. This helped them establish their conservation NGO, called Nama. Dave has led excursions to all three jaguar study regions with dedicated team members since 2017. They came to be keynote speakers at Katie's Night in 2018, and the KACF executed a very successful jaguar conservation event with them in Manhattan, NY, last fall that raised over $5000. From this initial effort, the conservation connections led to primate studies on howler monkeys, macaw recovery work, wildlife rehab and rewilding focusing on sloth and tamandua, and sea turtle hatchery work. Dave has led trips there three times already in 2024 where they just released 414 sea turtle hatchlings, with many being the critically endangered hawksbill turtle. They also helped to plant 1180 trees in the Bijagua community for tapir conservation. The community engagement and educational components are central to these efforts, fostering a greater understanding of the importance of preserving these iconic species. Mr. Dave is now working on a new children's book that brings to life jaguar conservation and the efforts of the devoted Nama conservation team.

South Africa

In South Africa, KACF supports anti-poaching initiatives and monitoring projects for rhinos and elephants. Collaborating with local conservation groups, the organization works to safeguard these majestic animals from the threats of poaching and habitat loss. The organization has helped collar wild elephant bulls to study conflict and has been part of a team that helps trim rhino horn to save them from poachers. Kruger National Park has gone from 18,000 rhino to 1500 in the last decade. The KACF supports the anti-poaching dog team, the rangers, the future rangers, bush pilots, and teachers in this region. This includes paying an annual teaching stipend to one of the teachers who is helping students entertain careers in conservation. Every year they get to take these future rangers on safari into Kruger National Park and let them see the wildlife they long to protect. They also partner with the Zulu Nyala team, Global Conservation Corps, and the Southern African Wildlife College. Last year they led three trips to South Africa and this year have done two more

with the next coming in September with a group of 20 that includes zookeepers and zoo volunteers who want to make a difference. The KACF team bought $5000 worth of field boots for the rangers saving rhinos in honor of their colleague and friend, Anton Mzimba, who was killed by poachers when they were traveling there in 2022.

Tanzania

In 2016, Dave took his Climbing for Rhinos efforts to new heights. He had been leading groups up the local Colorado 14'ers for years, but this time they decided to climb Mount Kilimanjaro for rhinos. They had a group of 20 go to Tanzania to support black rhinos by ascending the tallest mountain on the continent. Their population at that time was around 90 animals in all the country. The KACF was helping to fly zoo rhinos from Europe back to Mkomazi National Park to set up a breeding population. A film crew went with them to create the conservation documentary called "In the Footsteps of Giants". They started a soccer tournament on the outskirts of the Sergengeti National Park that year that still goes on today. With their financial support the lion, leopard, elephant, and rhino teams will soon be squaring off again to unite the local villages in conservation and community fun. Now they are supporting Lameck Mkuburo and the Tanzania Elephant Foundation. The KACF provides Lameck with educational sponsorship so he can attain his PhD on elephants. They put up beehive fences to help with human/elephant conflict, collar elephants, dance with the ladies, play soccer with the youth, and go annually to visit these teams. They brought Lameck here to the US twice to speak in Denver and around the country on his elephant work that now has many different zoos and zookeepers engaged with African elephant support. Last summer they made the documentary film "Jumuiya" with filmmaker Michael Hartzog. This film has been in several film festivals, including the Colorado Environmental Film Festival, and was played on the local PBS stations in Colorado.

Partnerships and Collaborations

KACF's success is rooted in its strong partnerships with zoos and zookeepers. By leveraging the expertise and resources of these institutions, KACF amplifies its impact, implementing effective conservation strategies and fostering a global network of conservation advocates. The team is hoping to create a positive resonance with zookeepers that helps them with passion projects, keeps them aligned in the field they love, and brings about collaboration instead of the competition for funding and support. Dave is hoping to create new children's books focused on all the zookeeper stories and the efforts that different zoos are excited about. They look at this opportunity to mentor and create positive change.

Conservation Travel and ICE Initiative

KACF offers conservation travel opportunities, allowing participants to engage directly with conservation projects and witness the impact of their efforts firsthand. These trips promote environmental awareness and inspire a deeper commitment to conservation. They also allow zookeepers to raise their own funding by selling children's books at local zoos or selling the team safaris to South Africa. The concern is that zookeepers cannot generally afford to travel for passion efforts, but the KACF helps bridge that gap.

The Inspiring Community Engagement (ICE) Initiative is another cornerstone of KACF's work. This program connects distant communities through art, education, and cultural exchange, fostering a global conservation community united in its mission to protect wildlife. ICE utilizes all the KACF core efforts to maintain viable conservation threads. These include virtual reality headsets, education, conservation, children's books and the resonance created by shared success. The team invites all the AAZK keepers to join them somewhere on the planet and make a difference in this world.

Children's Books and Education

Dave Johnson is an accomplished author of children's books, using storytelling to inspire the next generation of conservationists. His books highlight endangered animals and emphasize the importance of conservation, engaging young readers and fostering a lifelong love for wildlife. It all began in Alaska when he was snowed in waiting for bears in the BLM traps. He missed the kids and the educational angle that zoos provide. He began writing poetry about a little girl named Sissy Sally Sassafras, which was named after his favorite tree in North Carolina. Years later this young heroine would take shape in the "Elephants of Denver" book that came out in 2012. It was just in time to engage an elephant loving community with the new exhibit entitled Toyota Elephant Passage. Next Dave wrote "Narayani: The Unicorn of Nepal" which was about a little injured rhino from Chitwan National Park. Finally, he brought out a much broader appeal to the masses by creating "Zoodiac Kids" which ties in conservation with children's birthdays and instead of being aligned by the stars of the zodiac, now kids can tie in their birthday months with animal superhero partners. Now he is working on "I Am Katie" which is allowing Katie to pass on her baton of conservation to the next planet guardians. Dave is also collaborating with passionate animal conservation teams to create a mountain lion book in Utah, a jaguar book in Costa Rica, and efforts with coral, shark, and teams where the KACF travels. So many projects, so little time.

Achievements and Future Goals

As KACF celebrates its tenth anniversary, it reflects on significant achievements, including successful conservation projects in several core areas, but also doing smaller projects with areas and species where we are not traveling yet. We have pine marten in the UK, lynx in Spain, frogs in Ecuador, penguins in South Africa, and more. Looking ahead, the organization aims to expand its reach, continue building strong partnerships, and inspire more individuals to join the fight against extinction. They are not just about pachyderms any longer.

Conclusion

The Katie Adamson Conservation Fund, under the leadership of Dave Johnson, has made remarkable strides in global conservation. Through strategic partnerships, community engagement, and a commitment to education, KACF is making a lasting impact on wildlife conservation. As they look to the future, they invite you to join us in their important mission to protect the planet's precious biodiversity and empower the people to work together so we all may thrive.

Saving the World, One Sip at a Time: what we've learned from 13 years of Drinking for Conservation

Point Defiance Zoo & Aquarium
Suzanne Akerman, suzanne.akerman@gmail.com
Shana Osmer, shanajimalu@yahoo.com

Point Defiance AAZK's Drinking for Conservation committee has been organizing successful fundraisers for thirteen years, and raised nearly $50,000 for in situ conservation. Our team has partnered with numerous venues to host events such as Guzzling with Grizzlies, Celebrate for Sea Turtles, and Pints for Pachyderms. With over 100 events under their belt, the committee has streamlined their processes for connecting with partners and promoting events. We would love to share with other chapters who are hoping to raise funds through this enjoyable method, and who are aiming to create lasting partnerships in their communities.

Saving the World, One Sip at a Time:
What we've learned from 13 years of Drinking for Conservation

Suzanne Akerman, Staff Biologist
Shana Osmer, Animal Handling Volunteer Team
Point Defiance Zoo & Aquarium
Tacoma, WA

Have you been considering throwing a Party for Penguins? Or organizing a Toast to Tigers? Or maybe you want to enjoy some Beer for Binturong? Point Defiance AAZK's Drinking for Conservation (DFC) committee has been hosting events like these to benefit in situ conservation efforts for over thirteen years in Tacoma, Washington. During this time, DFC has raised over 50,000 dollars, and the committee chair earned the Nico Van Strien Leadership in Conservation award in 2023. Our committee would like to share some ideas to help other chapters achieve their fundraising goals using this format as well.

One of the keys to the longevity of DFC's success is its simplicity. On a single night, we gather as many people as possible at a venue, which then donates a portion of their profits for the given timeframe. Keeping the preparation and organization to a minimum helps us to have the energy to host an event every month. For most of our events, that's the extent of the fundraiser.

Because our committee is called Drinking for Conservation, we generally partner with venues that serve alcoholic beverages, but we have partnered with establishments offering a percentage of food sales, and our family-friendly partner locations sometimes donate for non-alcoholic drinks as well. When explaining our mission, we make it clear that our emphasis is on the "conservation" part of our name, not the drinking. Our method of fundraising could be easily applied to coffee shops, food trucks, retail stores, or any venue who would be willing to partner for your cause.

So where do you begin? Before you take any steps toward organizing an event, consider what you'd like to accomplish. Are you raising money for your chapters' general funds? For a conservation cause? Or for your professional development committee? Many times, event organizers already have their goals in mind, but stating them will help focus efforts more directly.

Consistency is Key

Over time we have had some stand-out events that earned impressive amounts to donate to worthy organizations, but the majority of DFC's contributions are comparatively small sums, ranging from $300 to $500. We understand these are modest donations that, while perhaps not mind-blowing, will add up over time, and because the events require so little effort to orchestrate, the earnings are always worth the effort.

If an event one month doesn't earn as much as we'd hoped, or isn't as well-attended as we'd predicted, we shrug it off and keep planning for subsequent months' events. Any amount raised will be accepted by the organization of your choice, and as zookeepers all know, every drop in a bucket counts.

Getting started:
Choose a venue, choose a cause, choose a name

Finding a venue can be the hardest part of organizing an event, and you might have to ask several places before you find one willing to work with you. Try approaching venues that:

- Are small businesses where you can talk to owners in person. Face-to-face requests are the most effective and you can speak directly with the people making the decisions.
- Are businesses that your AAZK chapter members and zoo staff already like patronizing. These places may already know some of your zoo staff and membership, and you can ensure a good turnout.
- Are venues where you would feel comfortable approaching other patrons. Every bar or restaurant has its own atmosphere, and some places attract clientele that will be open to chatting with you about conservation. Find these places! At other venues, clientele will stare at you blankly, and silently (or loudly) wish for you to stop speaking to them about frogs.
- Have a history of philanthropy. If you know of a venue that has donated items to auctions, or has supported other fundraisers, they may have a business philosophy that includes routine donations and fundraising.
- Cater to your audience. If you hope to have lots of families with kids attend, search for venues that allow minors, or have kids' menus. If you know your chapter has a soft spot for IPAs, choose a local brewery rather than a wine bar.
- Are the right size for your group. While you won't be able to predict the turnout for your events, you will probably still know when you've found the Goldilocks venue. A bar that can host 200 people might feel cavernous if you think you'll only be bringing in 35 guests. Conversely, a hole-in-the-wall distillery meant for small tasting groups might not be able to squeeze you all in.

Business owners and managers who are in a position to make decisions about partnering for fundraisers can be difficult to contact. Use all available means to connect, including the "contact us" button on webpages, social media messaging, or phone calls during non-peak hours. When searching for a venue, we've found it more common to hear nothing at all than to hear "no." Of course, there will be times when businesses will decline to partner with you, and while this is never fun to hear, don't be discouraged. Just ask some place else. We have also had the experience of initially having a venue decline to host DFC, and later contact us when they are ready.

When you approach a business to partner with you, either in person or via phone or email, we have found certain tactics to be successful. Here are some of our general guidelines:

- Above all else, be polite. Tell the business that you chose to approach them because you know people find their establishment enjoyable.
- Be flexible. Let the venue choose the date if you can, and allow them to decide what donation deal they would like to give you. DFC allows venues to choose the timeframe and amount donated. Sometimes we provide examples, “$1 per pint from 5pm to 9pm,” but we always accept whatever offer they give.
- Tell the venue about your previous successes if you have done these events in the past. Let them know what’s in it for them. Do you have social media platforms or other methods of promotion that would help them attract new customers?
- Once you have some events under your belt, tell potential new partners how successful your events were from the venue’s perspective. In addition to touting that you raised $400 for spoon-billed sandpipers, tell them that you were able to bring in 50 customers on a weeknight.

DFC has outlasted numerous establishments throughout our 13-years organizing events, since we often partner with locally owned, or family run businesses, and our committee spanned a pandemic that sank many venues of all sizes. So though we have found venues that are solid DFC supporters, willing to host multiple times per year, we also are frequently adding new venues to our rotation.

If you don’t already have a chosen organization in mind, give some thought to what cause you find inspiring. Our Drinking for Conservation committee chooses to donate only to in situ conservation efforts, and in accordance with AAZK policy, we are careful to select reputable non-profit organizations with registered 501(c)3 status. Some thoughts that guide our selections are:

- People love saving bees and tigers, but you will likely have to do some educational leg-work if you want to Frolic for Fossa, or enjoy Drinks for Dugongs. Consider what causes will inspire people to come to the event, but also what causes a venue might feel inspired to support.
- Fun names will break the ice, get people interested, and convey the light tone of your events, but be aware that if you try to get Hammered for Hornbills, Sloppy for Okapi, or Overserved for Orangutans, your state’s liquor board will not be pleased.
- We take suggestions for causes from our general fanbase and from our chapter membership. If someone has an animal they want to help save, we can very likely find an organization to donate to.
- Sometimes you will already know what species you are raising funds for, but since DFC does an event each month, occasionally we allow the venue to choose an animal species that is special to them.
- If your beneficiary organization is local, reach out to tell them about your event so they can attend. Even if the organization is based far from you, they may still want to help with promotion or highlight your event on social media.

- If the species you'd like to help is not endangered, or you can't find an organization doing projects dedicated to it, you can probably find a loophole. If you can't find anyone doing work to save Amazonian electric eels, you could probably find an organization working to conserve Amazon rainforest habitat where they live.

Promoting:
Find your people, rinse and repeat your process

Another crucial factor in organizing a successful event is spreading the word to people who would be interested in your event so they can attend. Over time, DFC has streamlined the promotion we do for each event so that we reach our desired audience without undue stress. As you discover which promotional avenues are most effective, you can hone your efforts to concentrate on these areas.

- Think about who would be interested in attending your event, and promote where they would be likely to see it. Zoo staff and zoo visitors are likely to be in your target audience, so reach out to them if your facility allows you to. Our volunteer coordinator also consistently sends DFC event announcements to our entire volunteer roster.
- Other places where you might find your target audience of nature enthusiasts, conservationists, and animal lovers would be locations like pet supply stores, outdoor equipment stores, and community centers. Put up promotional posters at these places if they have bulletin boards, or windows to display event information.
- Build relationships with the businesses where you are hanging posters. We hang posters at many of the same places each month; they may talk up your event to their customers or even attend themselves. You may also want to get to know the staff at your local print shop if you are planning to have materials printed regularly.
- Use social media whenever possible. If you are social media savvy, you can tag and co-host with your venue, and ask other organizations to share your posts to reach wider audiences.
- Reach out to your chosen beneficiary organization. If they're local, they may want to attend, and even if they're located farther away, they will be thrilled to know about your event. They may even be able to assist by promoting through social media, or providing photos for posters.
- Make templates for your posters and social media posts so you can easily switch out the information for each event, rather than recreating new promotional materials each time. This will also help you build a "brand" presence, if you're hoping to do so. We keep a list of the businesses willing to regularly hang our posters, which includes details such as who to give the poster to, or where to hang it (See Appendix).

At the event:
Be present, be polite, bring a bucket

During the event itself, we ensure that members of your AAZK chapter or committee can be present for as much of the promoted timeframe as possible in order to greet people and answer questions. We bring our iconic white “tip bucket” to every event and approach tables that look open to talking to us. We thank people for attending and let them know the bucket is available for additional donations.

- Approach and greet each person in the venue whose body language conveys that they would be open to talking to you. Be just a little braver about this than you think you should. Sometimes groups who seem initially aloof sometimes are the most excited about your event.
- People at your venue will be happy to know that their night out is helping animals. Frame your approach as a way of appreciating their presence, rather than as a request for more donations. Be courteous in all situations, this applies to all patrons and all venue staff.
- Keep your spiel brief, but be ready to engage further if the patrons are interested in the cause or your AAZK chapter. If you find people who came out to the event who are not from your AAZK chapter, ask them how they found out about the event. This will let you know what promotional tactics are paying off.
- Have a QR code easily available for people who want to go to your website or donate online.
- Have information about your next event ready so people who want to attend more events like this know how to find you. Give them your social media info so they can follow you, and hand out small slips of paper with the upcoming events listed. You could use this technique to support other fundraising that your chapter does also.
- When you leave the venue, find the person who helped you set up the event (if they are present) and thank them for the evening; pass along any compliments or information that they might enjoy, such as an estimate of how many people showed up specifically for the event, or how people loved the beer selection.

After the event:
Follow up, pick up

After the event has finished, we still have a few to-dos that will ensure everything goes smoothly and that the venue will want to partner with us again. We aim to forge friendships within our community and focus on the relationships above the finances.

- Email or text your contact at the venue as soon as possible after the event. Thank them and tell them what you enjoyed about the evening.
- Within this email, provide your 501(c)3 number (likely the second time you will have done this). Emphasize again who the check should be made out to. If left to their own devices, bar managers, even ones we have worked with before, tend to write out the check to our zoo or to the animal species, rather than to our chapter.
- We like to pick up our checks in person to thank the staff again for their service and generosity.
- Keep in touch beyond the event if you are hoping to partner with a venue again. We send holiday greeting cards to all of the venues who have worked with us each year.

Finally, it would be remiss to discuss the success of DFC without mentioning the dedication of the committee members who have remained enthusiastic about planning, promoting, and attending events for so many years. It is their willingness to keep planning these events and their commitment to making conservation fun that has brought enduring success to Drinking for Conservation.

Appendix
DFC Poster Hanging Cheat Sheet

DFC POSTERS:

FEW WEEKS PRIOR TO EVENT:
11 x 17 Cardstock double-sided (unless noted) (small = 8½ x 11)

(EVENT VENUE x4 or more; do they want file emailed?)

Stadium & Downtown:
King's Books (give to staff)
La Bella Salon (hang in lower right window in main lobby)
Urban Squirrel Thrift Store (give to staff)

6th Ave:
MSM Deli (hang on window to left of counter)
Gateway to India (hang in window if no one is at that table)
Shakabrah Java (single – hang by magnet on wall near cashier/kitchen)
Hi-Voltage Records (give to staff)
Lucky Dog (small – single – give to staff)
Valhalla Coffee (give to staff)

Hilltop:
Red Elm Café (small – single – hang on wall just past counter)

Proctor/Slope:
Lander Coffee (small – single – hang by thumbtack on wall to left of counter)
La Bella Salon (small – single – give to upstairs staff)
Wag (small – two singles or one double – give to staff)
Starbuck's x2 (outside – single – on board; inside – single – on board back door)
Chip & Co (for Peaks & Pints events only – give to staff)
Fleet Feet (for Peaks & Pints events only – give to staff)

North End/Pearl:
Edgeworks Rock Climb (small – single – give to staff at front desk or ask to hang)
Central Co-Op (single – hang on or near bulletin board past cashier)
Antique Sandwich (single – hang on lower wall to left of cashier)

Fircrest/UP:

Espresso Yourself (small – single – hang on wall to right of cashier or near door)
Orange Theory Gym (small – single – give to staff)
Happy Duo Café x2 (small – single – post on board; also large double on door)
UP Library (small – single – give to staff)

Zoo & NW Trek & DFC Mary:
Zoo Op's bulletin board (small – single)
Trek Haley (email pdf)
DFC Mary (email pdf)

WEEK OF EVENT:

8½x11 printer paper
(Print 9 single-sided, double image flyers, cut in half)
Mailboxes in Admin (total of 18 flyers)

DAY OF EVENT:

8½x11 Cardstock
Cut into bookmarks with details of future events, bring with!

PRINTING!

(EVENT VENUE x4 or more)

11x17 DOUBLE:
King's Books
La Bella Salon (Stadium)
Urban Squirrel Thrift Store
MSM Deli
Gateway to India
Hi-Voltage Records
Valhalla Coffee
Happy Duo Café
Chip & Co (for Peaks & Pints events only)
Fleet Feet (for Peaks & Pints events only)

11x17 SINGLE:
Shakabrah Java
Starbuck's x2
Central Co-Op
Antique Sandwich

8.5x11 DOUBLE (two singles ok):
Wag

8.5x11 SINGLE:
Red Elm Café
Lucky Dog
Lander Coffee
La Bella Salon (Proctor)
Edgeworks Rock Climbing Gym
Espresso Yourself
Orange Theory Gym
UP Library
Happy Duo Café
Zoo Op's bulletin board

Global Cheetah Problems and Solutions, a Call to Action

Laurie Marker, Cheetah Conservation Fund, director@cheetah.org

Today, 7,500 cheetahs remain in 33 populations in 23 African countries, with only 25 of the Asiatic subspecies remaining in Iran. Twenty populations have less than 100 individuals, with 80% of the remaining wild cheetahs living outside of protected areas. Cheetahs are threatened by habitat and prey loss, human-wildlife conflict, and illegal wildlife pet trade. These threats are compounded by climate change, human population growth and poverty, with grazing practices responsible for habitat transformation and degradation, accelerating desertification and negatively impacting wildlife populations. The cheetah is the Icon for arid landscapes and the threats facing their survival are multi-faceted and often interlinked. In recognition of this, the first Global Cheetah Summit was held in Ethiopia in January 2024, organized by the Cheetah Conservation Fund, hosted by the Ethiopian Wildlife Conservation Authority (EWCA), sponsored by NEOM and the Royal Commission for AlUla, in collaboration with Oxford University WildCRU, Cheetah Conservation Initiative, Cheetah Safe, the IUCN - Cat Specialist Group, Canid Specialist Group, Antelope Specialist Group, Conservation Translocation Specialist Group and Conservation Planning Specialist Group. The Summit defined actions, considering human development and wildlife needs, to reverse the cheetahs' decline and highlighted that conservation programs need to be scaled up and expanded. The Summit was an urgent Global Call to Action for more awareness and active engagement in cheetah conservation by range country governments, local and international NGOs, development institutions, zoos, and businesses. This paper will outline the needs and actions recommended at the Summit.

Global Cheetah Problems and Solutions, a Call to Action

Laurie Marker, CEO and Founder

Stijn Verschueren, Conservation Scientist

Cheetah Conservation Fund

Otjiwarongo, Namibia

Abstract

Today, 7,500 cheetahs remain in 33 populations in 23 African countries, with only 25 of the Asiatic subspecies remaining in Iran. Twenty populations have less than 100 individuals, with 80% of the remaining wild cheetahs living outside of protected areas. Cheetahs are threatened by habitat and prey loss, human-wildlife conflict, and illegal wildlife pet trade. These threats are compounded by climate change, human population growth and poverty, with grazing practices responsible for habitat transformation and degradation, accelerating desertification and negatively impacting wildlife populations. The cheetah is the icon for arid landscapes and the threats facing their survival are multi-faceted and often interlinked. In recognition of this, the first Global Cheetah Summit was held in Ethiopia in January 2024, organized by the Cheetah Conservation Fund, hosted by the Ethiopian Wildlife Conservation Authority (EWCA), sponsored by NEOM and the Royal Commission for AlUla, in collaboration with Oxford University WildCRU, Cheetah Conservation Initiative, Cheetah Safe, the IUCN - Cat Specialist Group, Canid Specialist Group, Antelope Specialist Group, Conservation Translocation Specialist Group and Conservation Planning Specialist Group. The Summit defined actions, considering human development and wildlife needs, to reverse the cheetahs' decline and highlighted that conservation programs need to be scaled up and expanded. The Summit was an urgent Global Call to Action for more awareness and active engagement in cheetah conservation by range country governments, local and international NGOs, development institutions, zoos, and businesses. This paper will outline the needs and actions recommended at the Summit.

Introduction

The cheetah (*Acinonyx jubatus*) faces significant threats from habitat and prey loss, human-wildlife conflict, and the illegal pet trade. Their populations have drastically declined to an estimated 7,500 individuals in only 9% of their historic range. Free-ranging cheetahs now exist in 33 populations across 23 countries, with the majority living outside protected areas. The IUCN lists the cheetah as Vulnerable, and five subspecies are recognised, with two subspecies listed as Critically Endangered (*A. j. venaticus* in Asia and *A. j. hecki* in northwest Africa), one as Endangered *(A. j. soemmeringii* in northeast Africa), and two as Vulnerable (*A. j. jubatus* in southern Africa and *A. j. raineyi* in east Africa)

Recognizing the multifaceted and interlinked threats to cheetah survival, the first Global Cheetah Summit was held in Ethiopia in January 2024. Organized by the Cheetah Conservation Fund and hosted by the Ethiopian Wildlife Conservation Authority, the Summit brought together international conservation experts and stakeholders. The Summit outlined urgent actions to reverse the cheetah's decline, emphasizing the need for scaled-up conservation programs that integrate human development and wildlife needs.

This paper will present the recommendations from the Global Cheetah Summit and the necessary actions to enhance cheetah conservation efforts, ensuring the survival of this iconic species and the ecosystems they inhabit.

The Addis Ababa Declaration for Global Cheetah Conservation

Over 130 experts from diverse backgrounds undersigned the Addis Ababa Declaration for Global Cheetah Conservation. The Declaration outlines focal needs where immediate action is required:

Need 1 - Strengthen conservation engagement beyond conservationists

To date, most conservation action planning discussions have focused on the needs and views of conservationists and wildlife agencies, but effective responses to most threats are beyond the remit of those groups alone. Conservationists also often struggle to make a wider compelling case for cheetah conservation that specifically aids Governments, businesses, local communities and other groups to achieve their own desired goals.

Need 2 - Agree on rangewide priorities and a collective strategic plan

Regional and some national action plans for cheetahs exist, but they rarely seem to lead to sufficient action on the ground. There is no globally agreed species-level plan for prioritizing action with clearly agreed and measurable targets. Whereas many populations are well known, even basic information is lacking for some populations (e.g., in the Horn of Africa and North-West Africa). Species such as the tiger have benefited from joint approaches where NGOs and Governments have collectively identified key priorities and taken targeted action to achieve them. This approach would enable more strategic and impactful conservation of the cheetah and the ecosystems in which they occur.

Need 3 - Understand resource needs and identify potential opportunities

Financial and human resources for cheetah conservation are currently limited. There is a need to consider where financial resources should best be allocated, how they can best incentivize Governments and local communities to conserve cheetahs and their habitats, and how they can best be used to leverage increased global funding for cheetah conservation. There is also a need to build conservation leadership and action capacity rangewide, particularly in and around priority cheetah populations.

Global Cheetah Summit Working Groups

Working groups tasked with specific conservation objectives were launched and will focus on population monitoring protocols, addressing conservation threats, strengthening community-based conservation programs, exploring innovative funding mechanisms, and engaging diverse stakeholder groups. A schematic overview (Fig. 1) and scope of work of the different working groups is summarized below:

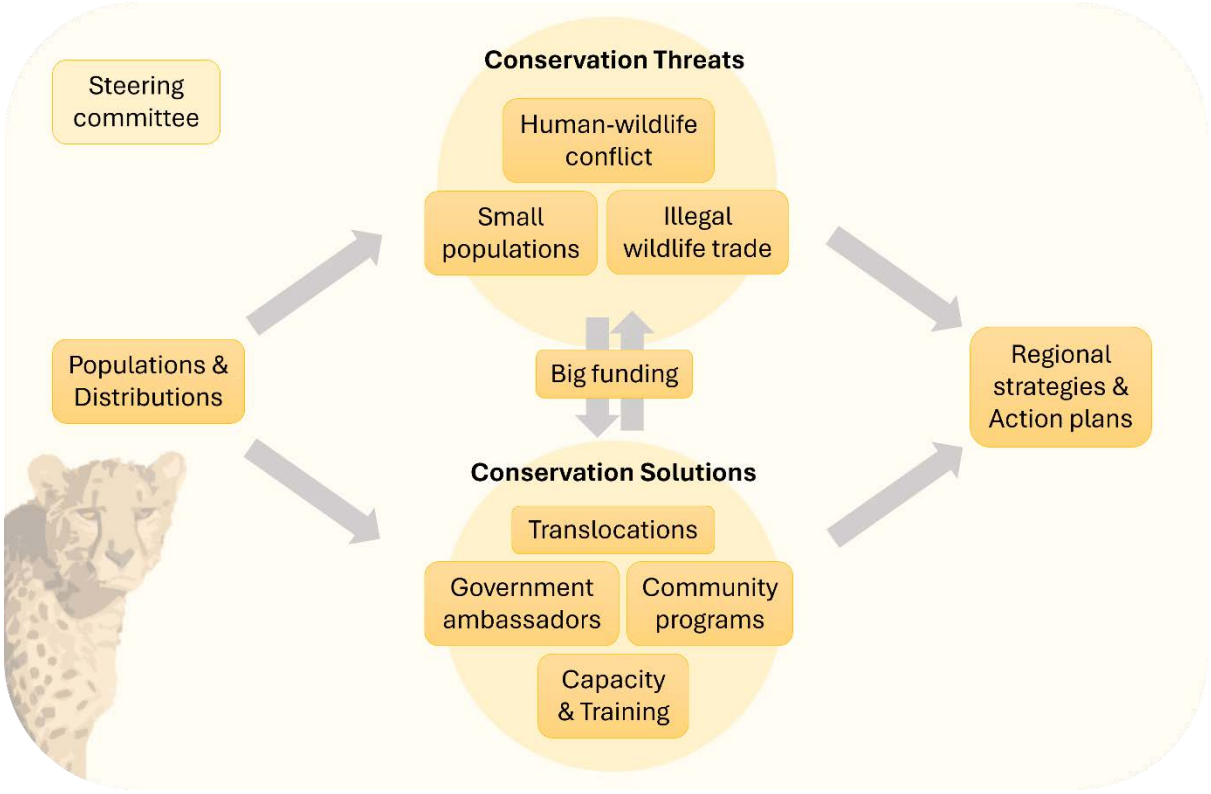


Figure 1. Schematic overview of working groups launched through the Global Cheetah Summit

Populations & Distributions

Understanding the population and distribution of cheetahs is crucial for effective conservation efforts. Monitoring protocols and collaborative initiatives can enhance data collection and analysis, leading to informed decision-making for cheetah conservation. The scope of work includes, but is not limited to: Compilation and organization of historic, current, and planned cheetah surveys and occurrence records into a comprehensive database. Establishment of protocols for standardized population monitoring across the cheetah's range, drawing upon successful methodologies employed for other felid species such as tigers and snow leopards. Coordination and collaboration with cheetah conservation groups, fostering information sharing and collective efforts akin to the African lion working group model. Implementation of range-wide modelling exercises to assess various aspects of cheetah conservation, including habitat suitability, connectivity, threats, and conservation prioritization.

Human-Wildlife Conflict

One of the greatest threats to the cheetah in the wild is human-wildlife (predator/cheetah) conflict. With over 80% of cheetahs residing outside protected areas, conflicts often result in preventive and/or retaliatory killings and persecution. The scope of work includes, but is not limited to: Review existing information rather than conducting further testing to create practical outputs and human-wildlife conflict resolution tools.

Small Populations

Effective conservation of small cheetah populations is vital for ensuring their long-term survival. Addressing the unique challenges faced by small populations, such as genetic bottlenecks and demographic instability, requires targeted strategies. The scope of work

includes, but is not limited to: Identifying and monitoring small, isolated cheetah populations to assess their genetic health and viability. Implementing genetic management practices, such as managed breeding programs, to enhance genetic diversity. Additionally, exploring the feasibility of establishing population corridors to facilitate gene flow between fragmented habitats. The initiative also involves developing action plans for the conservation of critically small populations, drawing from successful case studies of other species facing similar challenges.

Illegal Wildlife Trade

Illegal wildlife trade to supply the exotic pet market poses a significant threat to cheetah populations. Addressing this issue requires coordinated efforts to understand the dynamics of the trade, strengthen legal frameworks, enhance law enforcement, and raise awareness among key stakeholders. The scope of work includes, but is not limited to: Mapping supply and demand areas for cheetahs and their products, integrating insights from market research and stakeholder input. It includes investigating source populations, trafficking routes, and consumer countries through collaboration with relevant authorities. Additionally, it encompasses reviewing legal frameworks to strengthen cheetah protection and trade regulation. Furthermore, it involves designing and executing awareness campaigns targeting key stakeholders using diverse communication channels to convey the consequences of illegal cheetah trade and promote conservation efforts.

Translocations

Cheetah translocations and reintroductions can play a vital role in bolstering and re-establishing populations and enhancing genetic diversity. Establishing protocols and guidelines for translocation processes, identifying suitable source populations and populations for augmentation or reintroduction, and ensuring genetic viability are essential for successful cheetah conservation. The scope of work includes, but is not limited to: Compilation and review of existing protocols and guidelines for felid translocations, adapting and refining them to address the specific requirements of cheetah conservation. Collaboration with geneticists to develop tailored genetic guidelines for cheetah translocations. Additionally, assessment of cheetah populations to identify those in need of augmentation and evaluating potential reintroduction sites. This will also involve conducting viability analyses to assess genetic diversity, demographic stability, and overall fitness suitability for translocation efforts.

Government Ambassadors

Enhancing government awareness and engagement is crucial for advancing cheetah conservation efforts at the national and international levels. Establishing government ambassadors for cheetah conservation can leverage political support and facilitate resource mobilization for effective conservation action. The scope of work includes, but is not limited to: Assessment of government awareness and engagement with cheetah conservation, and developing strategies to secure their commitment, including ambassador recruitment. It also involves establishing networks for ambassadors to coordinate advocacy efforts. Additionally, it encompasses quantifying biodiversity and community benefits, creating communication materials, and appointing national cheetah coordinators to facilitate inter-agency collaboration. Key individuals should be recruited as ambassadors for cheetah conservation.

Community Programs

Community-based conservation programs play a crucial role in fostering sustainable coexistence between wildlife and local communities outside of national parks. Developing effective protocols and initiatives tailored to community needs can enhance conservation efforts while supporting livelihoods and promoting stewardship. The scope of work includes, but is not limited to: Assessing potential sites for community conservation programs, considering ecological significance, community engagement, and existing frameworks. This includes developing protocols for establishing conservancies, biosphere reserves, and other areas with local input. Additionally, it explores alternative livelihood development opportunities to promote sustainable economic activities. It also includes implementing local stewardship initiatives like community game guards and wildlife observers. It may also evaluate the effectiveness of wildlife credit schemes, compensation programs, insurance schemes, and product certification in incentivizing conservation and mitigating human-wildlife conflict.

Capacity & Training

Capacity building and training are integral components of successful conservation efforts, empowering local stakeholders with the knowledge and skills necessary to effectively protect cheetah populations. Identifying training needs and implementing relevant programs can enhance conservation capacity across range countries. The scope of work includes, but is not limited to: Assessment of training needs in range countries, considering the priorities outlined in national and regional cheetah action plans and outlined within the African Carnivores Initiative. Identify potential synergies and opportunities for collaboration and transboundary conservation efforts and facilitate workshops, trainings, and knowledge-sharing events among neighboring countries. Development and implementation of capacity building programs tailored to support locally-led conservation efforts, with a focus on building skills and knowledge at the community level. Evaluation of the feasibility and potential impact of establishing a grants program to provide financial support for capacity building initiatives.

Big Funding

Securing substantial funding is critical for implementing large-scale conservation initiatives aimed at protecting cheetah populations and their habitats. Exploring innovative funding mechanisms and leveraging diverse sources of financing can help meet the financial needs of ambitious conservation projects. The scope of work includes, but is not limited to: Exploring novel financing mechanisms and access to impact investment funds, green bonds, carbon credits and other unexplored sources. Additionally, it may entail collaborating with financial institutions and conservation organizations to secure large- scale funding. Furthermore, it may investigate the feasibility of transparent financing technologies like blockchain. The scope also explores integrating cheetah conservation into broader initiatives to attract additional support. Finally, it may include conducting cost-benefit analyses to assess the financial costs and implications of conservation efforts and potential losses from cheetah extinction.

Regional Strategies & Action Plans

Developing and implementing regional strategies and action plans are crucial for a coordinated and effective approach to cheetah conservation across different geopolitical areas. Tailoring conservation efforts to regional contexts ensures that they are responsive to local ecological, social, and political conditions. The scope of work includes, but is not limited to: Collaborating

with regional stakeholders to develop comprehensive cheetah conservation strategies and action plans. This includes identifying priority areas for conservation and setting region-specific targets. Additionally, harmonizing regional action plans with international conservation frameworks and agreements to ensure coherence and synergy. The initiative also involves monitoring and evaluating the effectiveness of regional strategies, adjusting them as needed based on emerging challenges and opportunities. Establishing regional coordination mechanisms to facilitate information sharing and collaborative efforts among neighboring countries is also a key component.

Steering Committee

The Steering Committee is established to oversee and coordinate the activities of multiple working groups focused on various aspects of cheetah conservation. Its role is to ensure alignment with overarching goals, facilitate collaboration between working groups, and provide guidance and support as needed.

Outlook

The Addis Ababa Declaration for Global Cheetah Conservation outlines initiatives for the next two years, emphasizing stakeholder engagement, strategic conservation planning, and the formation of working groups on key topics. The primary objective is to identify cheetah conservation priorities and create a framework for an integrated species conservation plan. This will guide evidence-based conservation practices and policies, translating into regional and national action plans for sustainable cheetah landscape management.

The second Global Cheetah Summit, scheduled for early 2026, will provide a platform to communicate project progress and engage with conservationists and stakeholders. Our vision is to foster a global coalition dedicated to ensuring the cheetah's survival through collaborative efforts that balance human development with wildlife conservation. By uniting resources and expertise, we aim to create resilient ecosystems where cheetahs and communities can thrive together.

Staff Engagement in Field Conservation at Denver Zoo

Megan Grady, Denver Zoo, mgrady@denverzoo.org

Denver Zoo has a robust field conservation department that works both internationally and locally. They have done an excellent job of engaging zoo staff who are outside of this department in their work, benefitting everyone involved - more help for field conservation and professional development for the staff who take part. First, they have field days that any employee can take part in. Second, they have project assistant positions, wherein an employee can dedicate some portion of their work time to assist with field work, data entry, education, etc for a specific conservation initiative. In this presentation I will elaborate on these opportunities and discuss how they could be applied at other institutions.

Staff Engagement in Field Conservation at Denver Zoo Conservation Alliance

Megan Grady, Lead Animal Care Specialist – Hoofstock

Denver Zoo Conservation Alliance

Denver, CO

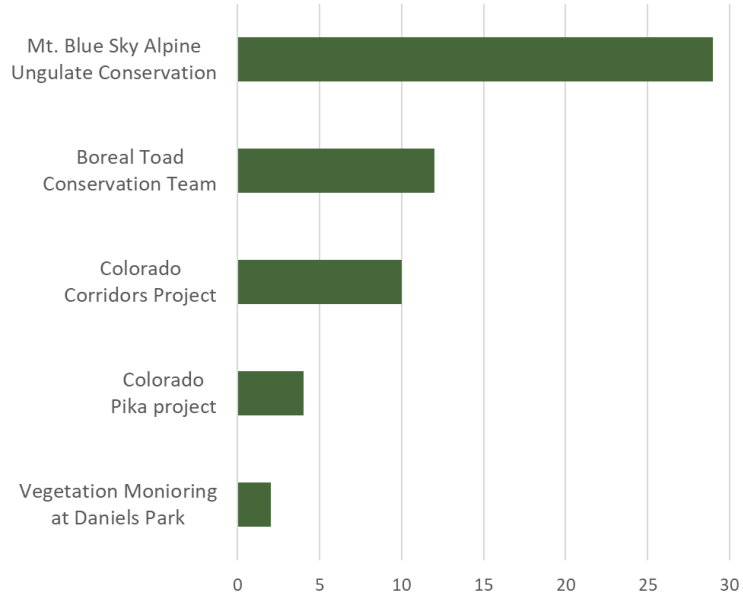
Introduction

This presentation includes a brief history of the Field Conservation (FCON) Department at Denver Zoo Conservation Alliance (DZCA), its current structure, and the institution's recent rebranding. The presentation will highlight two key ways this team has engaged staff from around the zoo. We hope this can serve as a guide for other zoos interested in integrating animal care staff with zoo-based field conservation efforts. Some zoos have similar programs on a smaller scale, yet Denver's program seems to integrate into operations in a unique way that is efficient, equitable, and rewarding. DZCA offers a case study for other zoological institutions to reference, enabling discussions of how to engage more staff in field-based conservation actions.

OZT Field Days

Starting in 2021, each spring, the Field Conservation team provides a list of projects and dates available. Staff can sign up for these dates with their supervisor's approval. Opportunities are for anyone at the zoo (OZT=One Zoo Team), not just animal care. The first graph shows participation numbers from 2023, highlighting the broad impact. (Figure 1).

Figure 1. Number of participants who engaged in each Colorado Field Project (n = 57).



Project Assistants

Four of our CO project areas have 1-2 project assistants. Full-time DZCA staff apply and interview for these positions, and successful applicants allocate 10% of their time to working with the FCON team.

What this has looked like for me: I am the Grasslands Project Assistant, focusing on grassland ecology, soil erosion, and bison management. Summer involves long days in the field, either helping with conservation camps or supporting research on grassland restoration efforts. Winter involves weighing plant samples, data entry, and other miscellaneous computer work.

Other smaller ways to engage staff

The FCON team has also hosted a conservation market, presented at Lunch & Learn events, met with teams to learn about our priorities, and introduced us to international programs. FCON takes any opportunity to include the whole OZT.

Takeaways

Conservation is the "why" for a lot of us – how can we share that more broadly? Engaging in conservation actions beyond animal care could possibly reinvigorate passion and help prevent burnout, which is a huge topic of discussion in the animal care field currently due to the high rates of turnover seen at many institutions. Figures 2 and 3 highlight the positive impact that these field days have on staff. For me personally, this has been an incredibly impactful

experience, keeping me excited about my work in addition to making me a better advocate for DZCA.

Figure 2. Satisfaction items

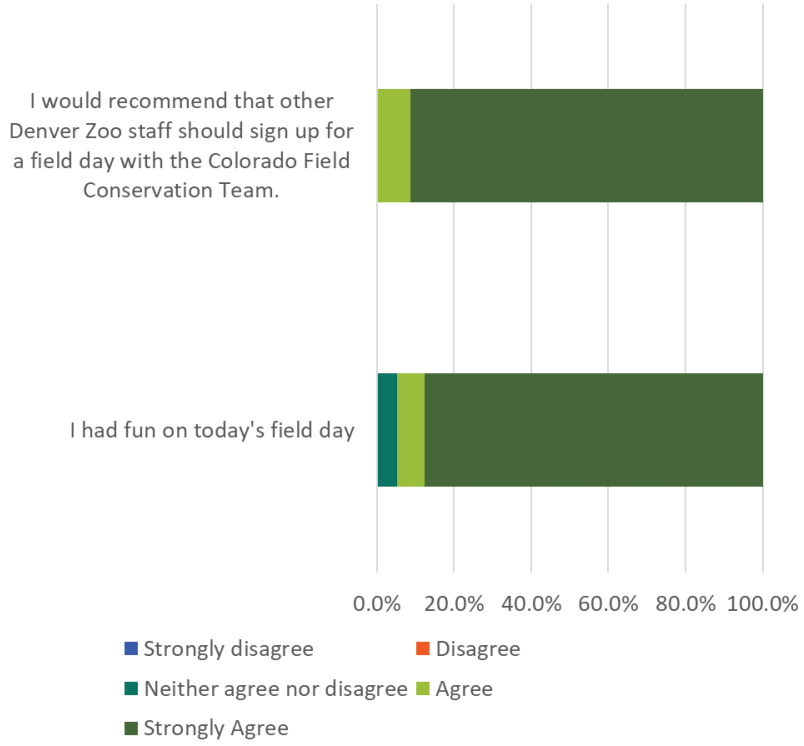
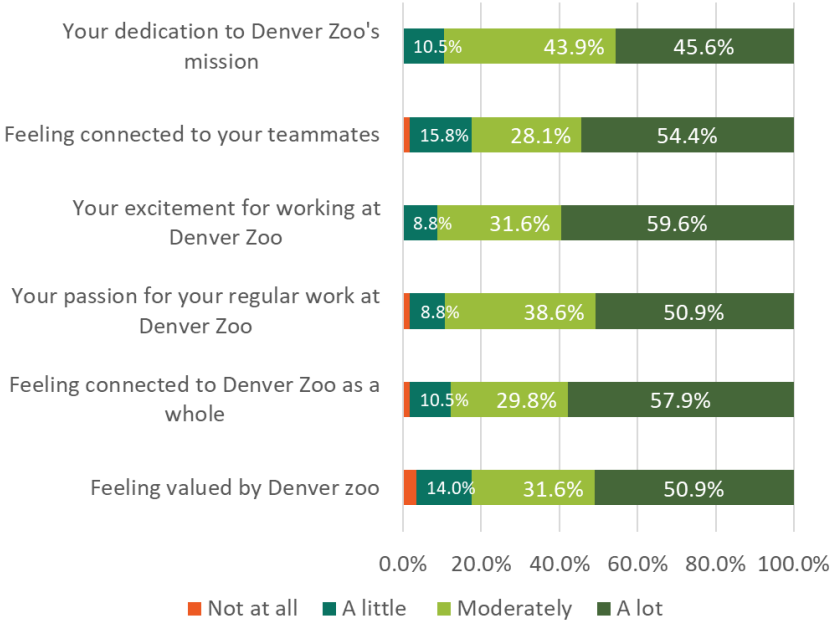


Figure 3. How has participation in today's field day contributed to the following? (n = 57).
(All responses of "not at all" were 3.5% or less)



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All Graphs/Figures from: Nageotte, N. PhD, and the Community Research and Evaluation team at Denver Zoo. 2023. "Staff Field Days with Colorado FCON: Evaluation Report."

American Trail Leading the Blind Grey Seal: Introducing a Blind Juvenile Grey Seal (Halichoerus grypus) to a Structured Training Program

Jackie Spicer, Smithsonian's National Zoological Park, spicerj@si.edu

In May of 2022 a juvenile grey seal was taken in by the Marine Mammal Stranding Center in Brigantine, New Jersey. After receiving initial care for injuries to her mouth it was discovered that the animal had bilateral juvenile cataract. Her vision was low, and she was deemed non-releasable due to her poor prognosis in the wild as a blind, young seal.

American Trail was contacted as a possible location to transfer the grey seal for a permanent home with the hope that she would live with the already established colony of four adult grey seals. In September of 2022 Josephine (Jo-Jo) was transported from the Marine Mammal Stranding Center to the Smithsonian's National Zoological Park's American Trail exhibit.

Jo-Jo was immediately started in conditioning to acclimate her to participating in her own health care training program. This presentation will go over the plan of action that the American Trail team put together to set Jo-Jo up for the best success to thrive in an operant conditioning training program. I will discuss what tools we created to work with a blind animal and the challenges we have encountered along the way, along with the successful behaviors Jo-Jo has learned so far, and future goals for her moving forward.

American Trail Leading the Blind Grey Seal:
Introducing a Blind Juvenile Grey Seal (*Halichoerus grypus*) to a Structured Training Program

Jackie Spicer, Animal Keeper
Smithsonian's National Zoological Park
Washington, D.C.

Introduction

On May 5th of 2022 a juvenile grey seal (*Halichoerus grypus*) was brought into the Marine Mammal Stranding Cetner (MMSC) in Brigantine, New Jersey. This facility is the only federally recognized stranding center for all of New Jersey. The initial intake records show that her condition was listed as alive and bright, alert, and reactive with a swollen muzzle and lower jaw, along with rapid eye movement.

MARINE MAMMAL STRANDING CENTER
3625 Brigantine Blvd., Brigantine, NJ 08203
(609) 266 - 0538

FIELD #: 22-060 SPECIES: Gray Seal SEX: Female

INITIAL ASSESSMENT	Date: 5/5/22	Location Stranded: ventnor; Nashville Ave and the beach
Weight: 43.8lbs	Condition: Alrt, BAR. Location hazard to animal, lots of calls. Lower jaw & muzzle swollen. Rapid eye movements	
Length: 39"		

DATE:	TIME:	FEEDING:	TREATMENTS/MEDICATIONS:	REMARKS:

Image 1: Initial intake notes from female grey seal pup coming into the Marine Mammal Stranding Center

On her second day at the stranding center, she was noted again with rapid eye movement along with "questionable eyesight". While recovering the care team would note that she often had trouble finding fish.

	2000	2 3/4lbs HMC		
		8 1/4 lbs total		
5-20-22	0900	2 3/4lbs HMC	1-mmvit	struggled finding caeplin
	1415	2 3/4 HMC		struggled w/ all fish
	2000	3lbs HMC	1cc levamisol	
		8 1/2 lbs total		

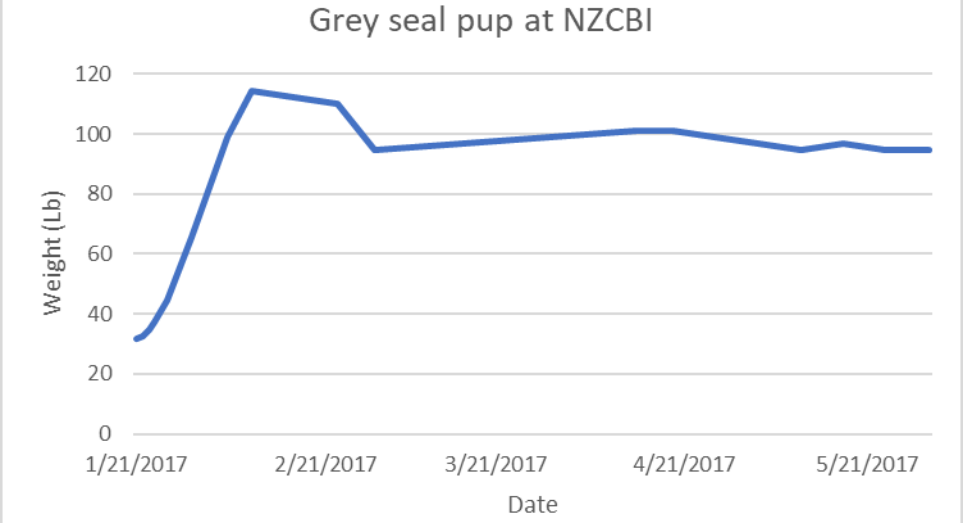
Image 2: Intake notes from female grey seal pup reflecting issues with eyesight

They also tried feeding her in natural water taken from the bay outside their stranding center, to check her visibility in water with less clarity and it was noted that she “struggled” and couldn’t find the fish. During visual exams, both eyes had what was believed to be cataracts. She was diagnosed with juvenile, bi-lateral cataracts. It is unknown what the cause of her cataracts were, but it was evident that her eyesight in both eyes was affected enough that she had issues finding fish. It was at that point that the decision was made that the best situation for her would not be releasing her back into the wild.

Grey Seal Characteristics

Image 3: Image of grey seal pup born at National Zoo and Conservation Biology Institute

Pupping season on the east coast of the United States for grey seals is generally December through February, with the majority being born in January (NOAA Fisheries, 2022). It is safe to assume this seal was about 4 to 5 months old in May, at the time of her intake. Her first recorded weight at MMSC was 44 pounds. Based off information gathered from a grey seal born at the National Zoo and Conservation Biology Institute (NZCBI) who was mother raised, we know grey seal pups will quickly gain weight in the first month of their lives. Grey seal mothers will nurse their young for about 3 weeks, while starving themselves. At a certain point, the mother will abandon her pup to feed herself and never comes back. The pup is on their own at this stage in their life. They must learn to hunt fish and sustain themselves. It is assumed grey seal pups gain so much weight while they nurse to provide their bodies enough nutrients while they are learning to hunt (Ailsa et al, 2001). They will initially lose some weight as this process happens. You can see our grey seal does lose about 20 pounds while they learned to eat whole fish. Once eating fish, they sustain their weight.



Graph 1: Growth chart from grey seal pup born at National Zoo and Conservation Biology Institute

With this rescued seal, it is believed that she was either born with the bilateral cataract, or sustained a major injury to her muzzle leading to damage to her eyes that caused the cataract. Either way, at about 4 months of age she was malnourished and clearly was not able to hunt fish on her own. A healthy grey seal pup at about 4 months of age would be almost doubled in size.

New Grey Seal Coming to American Trail

The National Zoo and Conservation Biology Institute (NZCBI) has housed grey seals since 1979. When the Marine Mammal Stranding Center contacted our facility about possible placement, the decision was easily made to accept her. Arrangements were made and transportation was finally able to happen in September of 2022. This grey seal had spent 4 months in the rehabilitation center and was ready for the move. Transport was relatively easy from NZCBI in Washington, D.C. to Brigantine, N.J. One veterinarian must be present for any marine mammal transport. The assistant curator of American Trail drove along with one member of our vet staff from NZCBI to pick up the new grey seal. This animal was given the name Josephine by a generous donor, the American Trail team has shortened it to Jo-jo.

Image 4: Photograph of Jo-jo while in quarantine

Training Program at NZCBI

The training program on American Trail at NZCBI uses operant conditioning focusing mostly on positive reinforcement. Operant conditioning is a training program that involves behaviors being controlled by consequence (Staddon and Cerutti, 2003). Consequences come in many forms, either in a positive (adding something) or a negative (removing something), which trainers use to shape behaviors into reoccurring or not. Positive reinforcement is the idea that adding something, in our case fish, will reinforce a behavior to happen again.

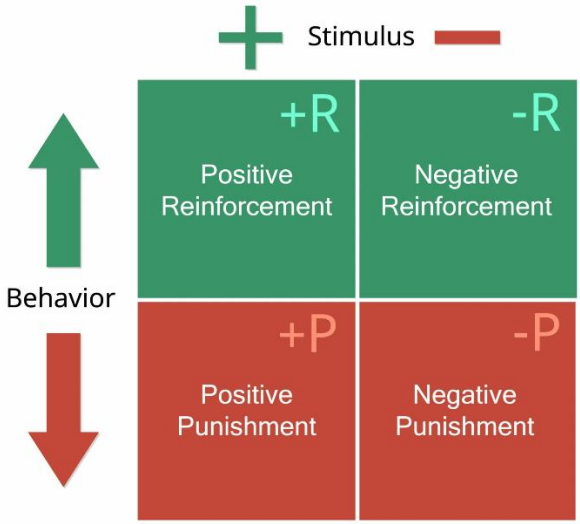


Image 5: Operant conditioning chart describing 4 ways to train (Nickerson, 2024)

The American Trail team wanted a solid training program for Jo-jo as soon as she arrived to provide the best outcome for her to thrive at our facility. Our discussions prior to Jo-jo's arrival included the use of verbal versus tactile cues. A verbal cue is one that is spoken to the animal to let them know what behavior to do. We, generally, do not focus on verbal cues as they can be very confusing in a session where animals can hear outside conversations or when the trainer is speaking alongside giving verbal cues. We use mostly visual cues, which would not be possible for Jo-jo as we assumed she would be blind and unable to see any visual cues. We decided tactile cues would be the most clear and concise cues we could create for Jo-jo. Since dealing with permitting around transport and movement of a protected species can take some time, our unit requested that MMSC start working with Jo-jo to begin acclimation into our training program. While still at MMSC, Jo-jo was introduced to a whistle bridge and had the whistle bridge reinforced.

Safety Behaviors

We focus on training what we consider "safety behaviors" first with any animal coming into our training program. Our list of safety behaviors creates a safe environment for both the trainer and the animal while working in sessions. These behaviors include targeting to a buoy, following the trainer around the exhibit, stationing on a frisbee, waiting while stationed, going into the water, and backing up. We created a target that would be audible for Jo-jo to hear and listen for, instead

of presenting an object that she wouldn't be able to see. This target was created by drilling a small hole into a buoy target, filling it with small beads, and sealing it back up. The target was incorporated in the beginning of her training and was trained by all keeper staff. Target training Jo-jo our most important behavior and needed to be trained as soon as possible. This behavior was trained at each session.

Image 5: Photograph of Jo-jo targeting to buoy

Jo-jo quickly learned the target behavior. Once she was targeting, we worked on having her move to the target. This was extended to a follow behavior where she would follow the sound of the rattle. This allowed us to move her on and off exhibit safely and without the need for force. After target and follow were established, everyone took one behavior to focus on training. This would allow Jo-jo the opportunity to start learning new things during her sessions, which is enriching for both Jo-jo and the keepers. Jo-jo learned how to station to a frisbee, where she places her head down on the frisbee while it's on the ground. The "wait" behavior was added into the station as a chained behavior. With her head on the frisbee, the trainer would give a verbal "wait". As long as Jo-jo stayed motionless on the frisbee the trainer would extend the period time between the cue and the bridge that would release Jo-jo from the station. This "wait" behavior was slowly extended so that we could move around her body without fear that she would move into us (or through us). Keeping both the animal, trainer, and any other person that needed to look over Jo-jo safe.

Image 6: Photograph of Jo-jo stationing on a frisbee

Back up was trained using the target pole held in one hand and having Jo-jo target to it. The other hand is used in a sweeping motion along the whiskers while moving the animal backwards. This behavior was trained while the hand sweeping the whiskers is covered in cut resistant kitchen gloves. In the photo below, you will notice that we transitioned to using a hand target instead of the target pole.

Image 7: Photograph of Jo-jo backing up

Hand hold is what we usually replace the target behavior with once we believe an animal is accustomed to an object being placed in front of their face without biting it. A hand hold was discussed and being necessary to build cues off of, as many of our tactile cues start from a hand target. But a blind animal new to a training program can naturally be grabby with anything being

put in front of their mouth. The target was trained first to make sure keepers were safe when initially working with Jo-Jo.

Conclusion

Jo-jo quickly picked up on the training program and learned all her safety behaviors within the first few weeks of being with us. After her safety behaviors were trained and passed off to every keeper working with her, trainers then started training other behaviors. Our staff mostly focused on training behaviors that would help us medically take care of Jo-jo. She has since learned how to open her mouth, receive eye drops, roll over onto her back, voluntarily move into a transport crate, allow tactile on her back and stomach, and voluntarily received her monthly birth control injections. Our goal when taking Jo-jo in was to create an environment where she could live with other seals while being a steward of conservation for her species. We also wanted the opportunity to fix her cataracts, which she had successful surgery to remove both cataracts in June of this year. She is still recovering and rediscovering what life is like with more vision (its scary!).

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Foundational Training: overcoming the challenges of preparing non-releasable animals for Wild Utah!

Sally Smolka, Utah's Hogle Zoo, ssmolka@hoglezoo.org

Wild Utah! is the newest exhibit at Utah's Hogle Zoo, presenting native wildlife and fostering connections between Utahns and the animals that often inhabit their own backyards. In late 2022, in preparation for this expansion, Hogle Zoo began acquiring non-releasable animals from wildlife rehabilitation centers and State and Federal wildlife agencies. Many of these animals were either deemed nuisance animals or were taken from their natural habitat illegally and were confiscated. Others, orphaned as young, were heavily imprinted during hand-rearing process during rehabilitation attempts. For these animals, the transition to life in Wild Utah! did not come easily, presenting many challenges for both staff and animals. Some of the behavioral obstacles that emerged included fear of humans, insatiable hunger, the introduction of animals, proper distancing with staff, door rushing, free contact, and being on exhibit for the first time.

Throughout this big transition, foundational training emerged as a pivotal tool for overcoming these behavioral challenges. The Ambassador team prioritized training foundational behaviors to navigate the complexities of working with animals with no prior training. Through three case studies, involving a North American porcupine, two yellow-bellied marmots, and an American badger, this paper will illustrate the power of foundational training strategies. This paper will also discuss how keepers trained these non-releasable animals to become ambassadors for their species, capable of inspiring Utahans to make a difference for native wildlife and wild places.

Foundational Training: overcoming the challenges of preparing non-releasable animals for *Wild Utah!*

Sally Smolka, Animal Keeper II

Utah's Hogle Zoo

Salt Lake City, Utah

Abstract

Wild Utah! is the newest exhibit at Utah's Hogle Zoo, presenting native wildlife and fostering connections between Utahns and the animals that often inhabit their own backyards. In late 2022, in preparation for this expansion, Hogle Zoo began acquiring non-releasable animals from wildlife rehabilitation centers and State and Federal wildlife agencies. Many of these animals were either deemed nuisance animals or were taken from their natural habitat illegally and were confiscated. Others, orphaned as young, were heavily imprinted during hand-rearing process during rehabilitation attempts. For these animals, the transition to life in *Wild Utah!* did not come easily, presenting many challenges for both staff and animals. Some of the behavioral obstacles that emerged included fear of humans, insatiable hunger, the introduction of animals, proper distancing with staff, door rushing, free contact, and being on exhibit for the first time.

Throughout this big transition, foundational training emerged as a pivotal tool for overcoming these behavioral challenges. The Ambassador team prioritized training foundational behaviors to navigate the complexities of working with animals with no prior training. Through three case studies, involving a North American porcupine, two yellow-bellied marmots, and an American badger, this paper will illustrate the power of foundational training strategies. This paper will also discuss how keepers trained these non-releasable animals to become ambassadors for their species, capable of inspiring Utahans to make a difference for native wildlife and wild places.

Introduction

In late 2022, Utah's Hogle Zoo began acquiring animals for their newest exhibit called *Wild Utah!* This area features species native to the home state of Hogle Zoo and its diverse biomes, from the arid Colorado Plateau and Great Basin to the lush Rocky Mountains. Through *Wild Utah*, guests are inspired to learn more about the wildlife that shares their home and learn how to conserve Utah's natural beauty and life.

Many of these animals came to Hogle Zoo from rehabilitation centers or from wildlife agencies leaving their exact histories' unknown. Their diverse backgrounds and the limited information care staff had access to led to many challenges when transitioning them to zoo life. When they arrived at the zoo, most of the animals were either showcasing stress behaviors around humans or pushing safe boundaries in free contact scenarios. After working through those immediate challenges, trainers needed to prepare individuals for introductions to a new space and the conspecifics they would share it with.

To prepare the animals for this big change, *Wild Utah* trainers implemented the Hogle Zoo standard progression of training priorities starting with foundational behaviors, such as, desensitization, targeting, stationing, calls to location, crating, scale, and shifting to help aid with challenges that would arise. The process of these ultimately successful transitions will be explained through three case studies evaluating 0.1 North American porcupine, 0.2 yellow-bellied marmots, and 1.0 American badger.

Case Study #1

Blackberry is a juvenile 0.1 North American porcupine *Erethizon dorsatum*. After wandering eight miles away from the closest forested area, through several neighborhoods, she was deemed a nuisance animal and non-releasable by a wildlife agency. Because of this status, she was brought to Hogle Zoo. Keepers began working with her by doing five- to ten-minute training sessions twice daily. This helped with trust building and building a reinforcement history to ensure that we were giving her the best chance at learning foundational behaviors, like targeting, in a short amount of time. There were only nine months to prepare her from when she cleared quarantine to her move to *Wild Utah*.

Despite being fearful at first, Blackberry quickly associated people with primary reinforcement-food. After leaving quarantine, she started rushing the enclosure door when keepers would attempt to enter. This behavior was often paired with trying to climb or grab keepers, climbing mesh, and displaying a stereotypical behavior of standing at the door, vocalizing, and rocking from side to side when the keeper did not enter right away.

Early training sessions focused on stationing; asking Blackberry to stand on a stump or platform and stay until reinforced. This behavior not only established safe boundaries but also redirected her focus away from food, leading to calmer behavior during keeper interactions. This behavior was taught in both free and protected contact. Blackberry was trained to station before keepers would enter her enclosure and remain there until the door was secure behind them. Once inside, keepers would ask Blackberry to move between several stations in her enclosure. This allowed keepers to keep her at a safe distance as an incompatible behavior to climbing or biting. Keepers also began to see a decrease in her anticipatory behavior of waiting at the door and rocking from side to side when training sessions occurred.

Blackberry eating her reinforcement for stationing on her platform

Trainers then focused on a target behavior. This behavior was trained in her enclosure and in the hallways of the building she was housed in prior to the move to Wild Utah. This included an outdoor area, which is along a high traffic area, allowed for distraction desensitization during sessions. After frequent target sessions, Blackberry responded well and would ignore many distracting stimuli and consistently focused on targeting. Although a basic behavior, the persistence in which it was trained allowed her to develop resiliency in the hectic period prior to and during her move to *Wild Utah*.

Before moving, Blackberry was introduced to 1.0 North American porcupine Barton. Barton was very eager to interact with Blackberry, but she met him with mildly aggressive behaviors like vocalizing, swiping at his face, and attempting to bite. Targeting was used to help redirect and separate the porcupines as needed during their first face to face introductions. Training the porcupines alongside one another helped form a positive relationship where both animals recognized they would receive reinforcement in both food and keeper attention if they remained calm in one another's presence. This helped facilitate safe interactions for both porcupines and keepers. These introductions were successful and led to Blackberry and Barton sharing an enclosure full time in *Wild Utah!*

A tandem training session; Keeper Anna with Blackberry and keeper Audra with Barton

Once the porcupines officially moved to *Wild Utah*, Blackberry maintained full criteria in her new exhibit despite the novelty and distractions. This shows that the consistent training of the foundational behaviors of targeting and stationing in the presence of different stimuli helped facilitate her transition from a wild nuisance animal to a successful ambassador for her species.

Case Study #2

Maisie and Buttercup, 0.2 yellow-bellied marmots *Marmota flaviventris* came to the zoo after rehabilitation attempts failed due to imprinting on humans. During this process, the rehabilitation staff would allow the marmots to chew on their shoes and crawl into their laps, which added some difficulty to the training process when they came to Hogle Zoo. Some of the main challenges trainers faced were in boundary management between keepers and marmots, the initial introduction of the pair, and routine management in their new enclosure. To help achieve this, marmots were trained one to two times daily for five-ten minutes.

Maisie came to the zoo in late 2022. She would rush to the door when keepers would enter and immediately chew on shoes and bite ankles. These undesired behaviors were prevented by teaching her to shift. Maisie would move into a designated holding space, where she was heavily reinforced, while keepers cleaned her enclosure. When trying to do free contact sessions with her, she was still biting keeper ankles or climbing legs. At this point it was decided that teaching her to target in a PC scenario in the shift could still allow for trainers to reward Maisie for calm, appropriate behavior. One side of the shift was mesh, allowing for protected contact training. These sessions enabled trainers to reinforce calm behavior which helped translate this demeanor into free contact sessions.

The new marmot exhibit being built in *Wild Utah* has both indoor and outdoor sections however, the door must be operated free contact. While shifting and protected contact training were helpful behaviors in her temporary exhibit, working with Maisie free contact was essential for future management. To add variety and keep frequent reinforcement of the calm shift session, morning training sessions would be done protected contact and afternoon sessions would be done free contact. These encouraged Maisie to maintain calm demeanor criteria for the next steps.

Another essential foundational behavior taught to Maisie was a call to location, or a “here”. The cue is tapping twice with a pointer finger and a verbal “here.” The animal must then come within two inches of the finger's location without touching the keeper. When working with Maisie and eventually Buttercup, this behavior allowed trainers to call the marmots to a high location on their perching so they could quickly leave the exhibit without the marmots following them.

In mid 2023, Buttercup came to Hogle Zoo. Buttercup faced similar boundary issues as were seen with Maisie. Trainers began working with Buttercup on the “here” behavior immediately. Once this behavior was established, the team began the introduction process for the pair.

Initial introductions were successful with limited food and keeper interaction. Marmots were introduced in a back-of-house space, but once they were successfully together for full days and nights, they were moved to an exhibit in the zoo’s Small Animal Building. This space allowed for them to be separated easier, which trainers initially used to do sessions while the pair was apart. Food was then introduced by scatter feeding less desired items, while higher value food was given during training sessions where the marmots were separated. Despite no competition for food or trainer attention, the marmots began aggressing on one another. At this time, trainers began tandem sessions involving one keeper per animal – like how the porcupines were trained to remain calm in one another’s presence. Keepers would often do well established behaviors (or behaviors under strong stimulus control), including “here’s”, that the marmots were confident in to enable positive sessions while together. Once this process began, there was an immediate decrease in aggression. Without the help of foundational behavior training, the long-term relationship of the marmots in their new home might not have been as successful.

After living together for a few months, they moved to their new home in *Wild Utah!* Their new habitat is quite different from their old enclosure. There are outdoor and indoor spaces, however, to shift them between spaces and close them off in one of the spaces to clean without marmots present, the trainer must be in the outdoor yard to close the doors. In their previous enclosure, trainers never had to enter the same space as the marmots for cleaning, however with their new enclosure this was a daily occurrence.

The “here" behavior became an essential tool in their transition to this enclosure. When trainers would enter the enclosure, the marmots would run into the secondary containment keeper catch area, at which point keepers could redirect them back into the enclosure. Then when it was time for the keeper to leave the space, they would cue the marmots to a high location on their perching so they could leave safely. While a shift door with a way to open and close it from outside their exhibit would have been ideal, foundational training allowed for proper and safe management of the marmots from the beginning of their time in *Wild Utah*.

Keeper Audra and Anna do a tandem training session with the marmots

Through consistent training in foundational behaviors like shifting and stationing or cuing to a specific location, the obstacles faced during introductions and transition to *Wild Utah* went more smoothly.

Case Study #3

Tony is a 1.0 American badger *Taxidea taxus*. Tony was considered a nuisance animal in a housing development, where he destroyed sidewalks and became habituated to humans. When Tony arrived at Hogle Zoo, veterinary staff discovered a shard of metal and a chunk of wood embedded in his chest. Veterinary staff performed a thoracotomy and middle lung lobectomy to remove these pieces surgically. The recovery time from this intensive surgery delayed preparations for Tony's life as an ambassador. Trainers only had 6 months to train Tony the foundational behaviors to help him transition for this significant life change.

When the Wild Utah team took over his care, he was incredibly skittish and would often either hiss or run away when approached, which added another layer of difficulty to his training. Trainers started out by working with him one to two times a day for five to fifteen minutes.

Trainers began by working only in protected contact. Once Tony was comfortable eating from tongs through the mesh of his enclosure in the animal hospital, trainers began shaping a target behavior. Tony learned the behavior quickly; however, he had a strong startle response. Any noise or change in the environment would cause Tony to run away. This caused concern for trainers as his future enclosure in Wild Utah would not only be a high guest traffic area, but also parallel to the Zoo's guest train track. This was expected to be a significant challenge, as his move from a quiet back-of-house area to his new enclosure was only a few days before the new area was scheduled to open.

Keeper Sally reinforcing Tony for targeting and Tony watching the train go by

Once Tony was more consistent with targeting and would stay with trainers the full duration of the sessions, they began desensitization training with other Hogle Zoo employees. Employees from all different departments would come to help approximate guest viewing. In the beginning, trainers incorporated five additional employees working towards over ten being present. In pre-session planning, these employees were instructed to speak loudly and make unusual movements while trainers would do a basic target training session. In the beginning, he was avoidant and would not come over to trainer, however as the daily training sessions continued, Tony would participate in the whole session. Despite targeting being the only behavior established at the time, this foundational behavior proved essential to trust building and desensitization to help prepare him for the unique environment surrounding the new enclosure.

The next big step to getting Tony ready to move to his new enclosure was crate training. Due to his positive response to target training and the strong relationship he was building with his trainers, it was decided that a crate behavior would be taught free contact. This process began with free contact target sessions. Although Tony was easily startled by trainer movements at first, he quickly became desensitized to keepers in his space and participated in these free contact sessions well. Once he was comfortable with free contact, Tony's progress on crate training was exponentially quick. With targeting as an aid, Tony only took a few weeks to master the crate behavior and he was able to voluntarily facilitate his own transfer to the new enclosure.

Tony then moved to *Wild Utah*. The first thing trainers prioritized was shifting. The new enclosure was quite large size, so trainers called him and reinforced for any orienting response. Once he would come into the shift area, keepers would do a target session to help him become more comfortable in the space. This allowed for a positive experience in the shift with a lowered chance of frustration or fear when the exhibit access door was shut behind him. With this strategy, keepers have had no issues with Tony refusing to shift since moving.

Keeper Sally doing a free contact target training session with Tony

Lastly, due to the success of his crate training being done free contact, the Wild Utah team wanted to continue with free contact work to train other husbandry behaviors and to do training demonstrations for guests. Once Tony was comfortable in his new space, including being comfortable around the Zoo's train, it was time to begin going free contact again. Trainers started by targeting in his enclosure just a few weeks post opening the area. After only a few sessions, Tony became just as confident, if not more so, with free contact scenarios than ever before.

Tony's journey of moving to *Wild Utah* shows how training foundational behaviors like targeting help overcome many challenges that arise when working with animals.

Conclusion

While the journey to prepare animals for new exhibit spaces is multifaceted, foundational behaviors can play a critical role in transitioning non-releasable animals to a zoo environment. The case studies of Blackberry the North American porcupine, Maisie and Buttercup the yellow-bellied marmots, and Tony the American badger demonstrate how such training can help overcome behavioral challenges and promote animal wellbeing. By establishing trust and cooperation, these techniques enable animals to become effective ambassadors for their species. Behaviors such as targeting, stationing, crating, and shifting not only address immediate behavioral challenges but also facilitate long-term adaptability and can lay the groundwork for any animal overcoming obstacles.

Contact Information

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Working With Veterinary Staff to Advance Training of Medical Behaviors in 1.1 Snow Leopards

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Binder Park Zoo houses 1.1 Snow leopards, Raj and Victoria. Both snow leopards actively participate in routine training sessions and consistently demonstrate the following standard behaviors: target, up, down, sit, and side. In addition, they are both trained to receive vaccines via hand injections. Due to COVID and the risk it ensued on snow leopards, it was urgent they receive the COVID vaccine, giving keepers little time to train for hand injections. After discussing the importance of vaccinating and not knowing if the hand injection behavior had been fully established, the veterinary team decided to give Gabapentin to help keep the leopards calm and increase the chances of success. Both leopards received practice pokes prior to being vaccinated so it's unclear whether the use of Gabapentin was necessary for this situation, however it has the potential to be useful for training reluctant individuals.

In spite of all the established behaviors listed above, keepers wanted to increase the complexity and variation in training and focus more on behaviors that would benefit their medical care. In conjunction with veterinary staff, keepers developed new plans to target behaviors identified for each animal based on their individual health needs. These behaviors included blood draw training for Raj and ultrasound training for Victoria. Through collaboration with the veterinary team, these behaviors have been successfully established and can be performed without Gabapentin or anesthesia.

Working with Veterinary Staff to Advance Training of Medical Behaviors in 1.1 Snow Leopards

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Abstract:

Binder Park Zoo is home to 1.1 Snow leopards (*Panthera uncia*), Raj and Victoria. Both snow leopards actively participate in routine training sessions and consistently demonstrate the following standard behaviors: target, up, down, sit, and side. In addition, they are both trained to receive vaccines via hand injections. Due to COVID and the risk it ensued on snow leopards, it was urgent they received the COVID vaccine. After discussing the importance of vaccinating, the veterinary team decided to give Gabapentin in order to help keep the leopards calm and increase the chances of success. Although Gabapentin may not have been necessary for this situation since the leopards had been poked a few times prior, it is a tool that could be considered useful for reluctant training participants.

Even with all the above established behaviors, keepers wanted to increase the complexity and variation in their training and shift to focus on behaviors that would continue to benefit their medical care. In conjunction with veterinary staff, the keepers developed new plans to target behaviors identified for each animal based on their health needs. These behaviors included blood draw training for Raj and ultrasound training for Victoria for pregnancy detection. Through collaboration with the veterinary team, these behaviors have been successfully established and can be performed without anesthesia or sedation. Although these behaviors have already been accomplished by other facilities, it is the first time it has been attempted at Binder Park Zoo.

Working with Veterinary Staff to Advance Training of Medical Behaviors in 1.1 Snow Leopards

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Introduction:

1.1 Snow leopards (*Panthera* unica), Raj and Victoria reside at Binder Park Zoo. Their care takers aim to provide the best husbandry for them and engaging them in behavioral training sessions is an essential part of their care. Both leopards have mastered their routine training criteria which includes simple behaviors such as target, sit, up, down and side. In order to keep the training sessions stimulating and beneficial, keepers decided to increase the complexity and begin introducing advanced behaviors that could assist the veterinarian team in providing medical care.

Routine health care for the snow leopards can be challenging and stressful as they are considered "no contact" animals and would therefore need to be anesthetized for most veterinary procedures. Training them to actively participate in their health care allows the veterinarian team to perform specific procedures without sedating them, thus eliminating those challenges while reducing stress and decreasing the need for anesthesia.

Before working on blood draw and ultrasound training, keepers had introduced hand injection training. The training process for hand injections was rushed due to COVID and the risk it presented to snow leopards. Because this was an urgent matter and the behaviors were not fully established, Raj and Victoria were given Gabapentin prior to receiving the first dose of the COVID vaccine in order to help keep them relaxed and increase the likelihood of being successful. They were both successfully vaccinated and have since received other injections without the use of Gabapentin.

Raj is 12 years old, which increases his risk of having health problems, so keepers felt it was important to get his cooperation in receiving medical care without being sedated. The training criteria for Raj was updated to include training for voluntary blood draws. Victoria is 7 years old and came to Binder Park Zoo on a breeding recommendation for Raj. Therefore, her training plan was updated to include ultrasound training so the veterinary staff would be able to detect and monitor any pregnancies. Through collaboration with the veterinarian team and determination from the keepers, the new behaviors have been achieved.

Training Set Up:

The designated training area for the snow leopards is a fenced in area with a wooden pallet for a "squeeze" and a small 4.5" X 6" door cut out at the bottom of the fence which would be used for blood draw training (**Figure 1)**. In addition to the basic training tools (clicker, syringe, feeding stick…etc.) we needed to introduce a snake hook to pull Raj's tail through the door, an electric

razor to shave an area of his tail, isopropyl alcohol to wet the shaved area, a bench for ultrasound training, ultrasound gel, ultrasound probe and a laptop. The reinforcements that worked well were chicken, beef chunks, & whipped cream.

Figure 1 Snow leopard training area

Step One:

The steps to achieve each animals' specific behavior are explained below. However, the first step for both snow leopards was the same, and that was to desensitize them to having two or more trainers during each session. Prior to updating the training plans, only one keeper was conducting the training, but since the veterinary team would need to be involved to accomplish the new behaviors it was necessary to prepare the snow leopards for having additional people present. Therefore, the snow leopard care team began to conduct regular training sessions with a second keeper in attendance. This way, once the veterinary team was introduced, the snow leopards would be more relaxed and ready to proceed to the next steps.

Raj Training:

As Raj ages, the importance of training him for voluntary blood draws has increased. Getting blood samples without having to sedate him will yield quicker and more accurate diagnostics and treatment plans while eliminating the stress of an immobilization. In order to provide the best possible care for Raj, a training plan was developed for voluntary blood draws. The updated plan would require multiple steps and participation from the veterinarian team in order to be successful. There were also some modifications of the methodology as we learned what was and wasn't working.

The new training criteria was implemented in September 2021 and began with desensitizing Raj to the small training door being opened and to having his tail touched with the snake hook. After just a few sessions, his tail was successfully pulled through the door. Raj was a bit grumbly during this stage, however he remained in position with his tail through the training door while the veterinary fellow palpated it in several areas. During the palpation process it was determined that finding a vessel through the fur was going to be difficult, so an additional step of applying isopropyl alcohol was introduced in order to wet the area and flatten the hair.

By the end of October, Raj seemed more relaxed and less vocal during these sessions, so the training proceeded by adding a "poke" command and using a blunt needle to poke his tail. This

process went on until April 2022 when again, it was concluded that even with the addition of wetting his tail, the vessel was still too hard to locate. Thus another step was added it was to shave a small section of his tail. Raj was then introduced to the sound and touch of the electric razor. He had no reaction to the buzzing sound or to being touched by the trimmer, so during the next training session a small patch was shaved where the blood vessel should be. The veterinary fellow then proceeded to palpate his tail and was able to insert a needle in the shaved section as well as redirect the needle after it was inserted. Raj was very patient and tolerated all of this very well. The first flash of blood was achieved on May 25, 2022. Even though it wasn't a large amount, it felt like a huge accomplishment and provided confirmation that getting blood samples from Raj's tail was possible.

In July 2022, a new veterinary fellow began her rotation and was introduced to Raj. The first few training sessions were focused on getting the two acquainted and reassuring Raj he could be comfortable with the new training member. By September, the new fellow was able to shave, wet his tail with isopropyl alcohol, and poke it with the needle. In October, a flash of blood was obtained. The process continued with obtaining minimal amounts until May 24, 2023 when ~3 ml of blood was collected! (**Figure 2**)

Figure 2: Veterinarian Fellow Dr. Allison Dianis with syringe of blood she obtained from 1.0 Snow leopard "Raj"

Due to the annual rotation of veterinary fellows through the fellowship program at Binder Park Zoo, it was determined that the best course of action for Raj was to have our on staff veterinary technician take over maintaining this behavior. This helped to keep Raj comfortable and ensured consistency with his training so this behavior is not lost. Raj continues to train well for voluntary blood draws and it is now a part of his regular training routine.

Victoria Training:

Victoria was brought to Binder Park Zoo on a breeding recommendation from the SSP to breed with Raj. Considering the intention is for Victoria to become pregnant, keepers felt that her training criteria should include ultrasound training and proposed a plan for this behavior. The process to achieve this was slow as Victoria was still getting acclimated to her new surroundings and keepers. She is also not always as food motivated as Raj.

In March of 2021, Victoria was finally coming into the training pen on her own and even appeared eager to complete basic training requests. At the end of March, keepers started to implement ultrasound training by beginning with a “touch” command and using the end of the target stick to touch her abdomen. She responded well to the stimuli and accepted her reward with no animosity. Then, keepers replaced the target with a retired ultrasound probe and applied diluted gel in order to desensitize her to the strange liquid. Once Victoria was comfortable with that, a laptop was set up to imitate an ultrasound machine and for her to get used to the unknown object.

By mid-May, Victoria seemed more relaxed with the training methods and appeared ready to move forward. The zoo veterinarian came over and set up the actual ultrasound machine. As Victoria came into the training area, the ultrasound machine was powered on and it was quickly realized she had not been prepared for the sound of the machine. As soon as it started making noise Victoria ended the session. Training was postponed following this session as it was anticipated that she was currently pregnant, and we were approaching her predicted birth window.

Training resumed in July, when Victoria was introduced to the veterinary fellow. Breeding did not occur in 2022 so the training sessions were now focused on maintaining her currently established behaviors while building her trust with keepers and varying individuals.

The SSP recommended for Raj and Victoria to breed in 2023 so Victoria’s ultrasound training was reinstated. The sessions started from the beginning, following the steps previously mentioned. In May of 2023 we added the sound of a fan to prepare her for the sound the ultrasound machine would make. By mid-June, once she seemed at ease with the noise and all the other components we had worked on, our staff veterinarian came over to attempt an actual ultrasound. Victoria did very well and allowed her abdomen to be probed, however, the results were inconclusive as Victoria’s body position was not quite close enough for the proper contact needed to obtain a clear image. Keepers then adjusted the training wall before the next session and did a few sessions in between to get her used to the new set up. During the next ultrasound a clear image was obtained badly sadly no fetuses were seen. In July, a third and final ultrasound for 2023 was conducted, again yielding disappointing results and concluding that Victoria was not pregnant.

During these training sessions, the veterinarian suggested that a table or bench would be beneficial in getting Victoria up off the ground, which would elicit more accurate results for future ultrasounds. So, the keepers built one and in December it was added to the training area. Training sessions for December were focused on getting Victoria comfortable with the new training bench and getting acquainted with the new veterinary fellow.

By January of 2024, Victoria was readily participating in her ultrasound training, however the training bench needed some modifications before attempting to actually ultrasound. Once the modifications were made, the altered bench was set up (**Figures 3 and 4**) and introduced to

Victoria. She got right on and trained well, but we were now approaching breeding season so training was paused once again. At the conclusion of breeding season, on March 21st, the first ultrasound was attempted. Victoria did well, however there wasn't a clear image because her fur was too thick. A second attempt took place on March 29th, with adding isopropyl alcohol in addition to the ultrasound gel to get better contact and again Victoria did very well. This attempt was partially successful in the fact that it produced an image of her bladder. However, the results were inconclusive as the timing may have been too early to see a fetus. More sessions were completed with appropriate images, but sadly no fetuses were detected and once again the conclusion was that Victoria was not pregnant. Although we were not able to get images of a vital fetus, this process was still successful as we were able to determine that there were no pregnancies.

Figure 3: Front facing view of ultrasound training bench.

Figure 4: Side view of ultrasound training bench.

Conclusion:

Through collaboration, determination, hard work, and patience, the new and enhanced training criteria for the snow leopards was accomplished! The success of this advanced training was not achieved quickly. It was a long process that presented many challenges including COVID, breeding, time constraints and other events that disrupted or delayed the training process. The staff involved were determined and dedicated to achieving these behaviors, so they preserved and pushed on through all the challenges and never gave up. Because keepers were able to

work with the Veterinarian team and schedule training sessions that did not conflict with any daily routines, the snow leopards have gained new skills. Raj will now accept vaccines and offer his tail for blood draws without animosity, while Victoria also accepts vaccines plus allows the veterinarian staff to ultrasound her. Overall, working together and not losing sight of the end goals contributed to the success of the training program.

Acknowledgements:

Thank you to the veterinary staff, who made time in their busy schedules to train with keepers and thank you to the dedicated keeper staff who were flexible and persistent in continuing training despite challenges and failed attempts.

Case Study: Use of Epoxy and Radiographs to Treat and Monitor Long-Term Class I Tusk Fractures in an African Elephant

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Flora, a 42-year-old female African elephant (Loxodonta africana), currently resides at The Elephant Sanctuary in Tennessee. She has naturally short tusks, which are prone to frequent minor fractures due to constant wear and usage. Traditional methods for radiographs and treatment on Flora's tusks were incredibly difficult, potentially unsafe for staff, and yielded limited access to the tusks. These factors presented a challenge in obtaining quality veterinary diagnostics which could aid in possible intervention in the event of a more severe fracture. In January of 2022, Flora's right and left tusks suffered a series of fractures (of unknown severity) that prompted veterinary and husbandry teams to seek solutions for improved radiographs and additional treatment options. When developing a treatment plan for Flora, The Elephant Sanctuary team sought to prioritize maintaining tusk functionality while providing protection as the tusks grew out. The goal was to create a custom plan, without the use of restraints or anesthesia, that fit into Flora's current positive reinforcement husbandry training while minimizing the impact on autonomy, choice, and control. After diligent training sessions, Flora learned to present for radiographs in a brand-new position that offered a full view of the tusks and associated fractures. Additionally, through much research and trial-and-error, the team developed an epoxy regimen aimed at reinforcing the tusk while still providing functionality and autonomy. The purpose of this paper is to outline the training plan, epoxy regimen, and overall timeline of Flora's tusk fractures and their ongoing monitoring and treatment.

Case Study: Use of Epoxy and Radiographs to Treat and Monitor Class I Tusk Fractures in an African Elephant (*Loxodonta africana*)

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Abstract
Flora, a 42-year-old female African elephant (*Loxodonta africana*), currently resides at The Elephant Sanctuary in Tennessee. She has naturally short tusks, which are prone to frequent minor fractures due to constant wear and usage. Traditional methods for radiographs and treatment on Flora's tusks were incredibly difficult, potentially unsafe for staff, and yielded limited access to the tusks. These factors presented a challenge in obtaining quality veterinary diagnostics which could aid in possible intervention in the event of a more severe fracture. In 2022, Flora's right and left tusks suffered a series of fractures (of unknown proximity to pulp cavity) that prompted veterinary and husbandry teams to seek solutions for improved radiographs and additional treatment options. When developing a treatment plan for Flora, The Elephant Sanctuary team sought to prioritize maintaining tusk functionality while providing protection as they grew out. The goal was to create a custom plan, without the use of restraints or anesthesia, that fit into Flora's current positive reinforcement husbandry training while minimizing the impact on autonomy, choice, and control. After diligent training sessions, Flora learned to present her tusks for radiographs in a brand-new position that offered a full view of the tusks and associated fractures. Additionally, through much research and trial-and-error, the team developed an epoxy regimen aimed at reinforcing the tusk while still providing functionality and autonomy. The purpose of this paper is to outline the training plan, epoxy regimen, and overall timeline of Flora's tusk fractures and their ongoing monitoring, management, and treatment.

Introduction
Tusks in African elephants (*Loxodonta africana*) are modified upper incisors that grow continuously throughout their lifetimes (Rose et al., April 2022). Because the tusks extend beyond the mouth and face, their risk of fracture is much higher than that of traditional teeth (Weissengruber, Egerbacher & Forstenpointner, 2005). As tusks grow throughout an elephant's lifetime, they can naturally regenerate after a fracture incident (Weissengruber, Egerbacher & Forstenpointner, 2005). However, older African elephants can experience slower rates of tusk growth (Rose et al., 2022), which limits their ability to recover after sustaining a fracture.

There are three main types of tusk fractures: class I, II, and III. Class I fractures only involve the outer area of the tusk (the non-vascular crown), class II fractures involve the periodontal ligament, and class III fractures involve pulp tissue (Rose et al., April 2022). Class II or III fractures in elephants can be quite severe, leading to pulpitis (infection and inflammation of exposed pulp), severe pain, sepsis, and even death (Rose et al., March 2022). Medical interventions for elephants in human care can include pulpectomies (removal of infected pulp) or full tusk extractions (Rose et al., March 2022). One study comparing elephants in South Africa to captive elephants (Rose et al., March 2022) reported 31% of elephants under human care to have some type of tusk fracture, compared to just 1.31% in free-ranging elephants. Most often in

human care, fractures result from interactions with conspecifics and impact against metal fencing (Rose et al., March 2022). Although minor in and of themselves, class I tusk fractures compromise the integrity of the tusk and create weak points. This means class I fractures have the potential to lead to more severe fractures, making early and proactive interventions critical to preventing more serious health conditions. This case study aims to explore ways to monitor and treat class I tusk fractures to prevent any instances of class II or III fractures in African elephants in human care.

Background

Since her arrival at The Elephant Sanctuary (or "The Sanctuary") in 2004, Flora has had naturally short tusks, which only extend a few inches beyond the sulci. Flora lives in a very diverse environment and has over 100 acres of land, hills, trees, and water sources to engage with. She frequently interacts with her environment and exhibits natural behaviors consistent of African elephants, such as such as digging mud, tusking bark from trees, and pushing down trees. These activities cause natural wear on the outer layers of dentin. Flora has sustained several class I tusk fractures since 2019 due to frequent use and wear, in addition to impacts with steel fencing. In addition, Flora tends to exhibit low levels of resiliency regarding novelty in her environment, which can cause instances of frustration and tusk-to-steel contact. These situations include enrichment at or above her head, new gates or fencing, novel enrichment or facilities, and new technicians or trainers. "Technicians" under The Sanctuary's training program refers to the people completing treatments or husbandry work, while the "trainer" is cues the behaviors to position the elephant, offering reinforcement, and managing the sessions.

More significant prevention measures, along with more frequent radiographs, were taken after fractures in January 2022 (right tusk) and December 2022 (left tusk). Each of these inciting fracture events were followed subsequently by other events in which already mobile (or partially mobile) pieces of the tusk from the original fracture broke or an already compromised tusk experienced additional fractures. According to Sanctuary husbandry records, Flora had a total of eleven fracture events of her right tusk and eight fracture events of her left tusk between January 2022 and June 2024. Anecdotally, the rate of Flora's wear on her tusks is faster than the rate of growth, based on pictures of Flora between 2004 and 2024. Flora could also be exhibiting the natural slower rate of tusk growth sometimes seen in older African elephants. This altered rate of wear and growth makes treatment in this case more challenging. While Flora has never experienced a class II or III fracture, her pre-existing risk factors prompted Sanctuary staff to develop a custom plan aimed at treating current fractures and preventing more severe ones.

When developing a treatment plan for Flora, Sanctuary's veterinary and husbandry teams aimed to build upon her current training repertoire and complete all treatments with voluntary participation under behavioral restraint. For the purpose of this paper, "behavioral restraint" refers to protected contact positive reinforcement training, in which caregivers cue a behavior and reinforce correct responses without the use of any negative reinforcement or punishment for incorrect behaviors. An elephant is asked to hold a position and allow for treatment while receiving reinforcement for calm behavior. While future or more severe fractures might require more drastic intervention, all of the training methods discussed in the following sections were conducted under behavioral restraint without the use of physical restraints (i.e. – tethers) or anesthetic drugs. Because Flora fractured her right tusk 11 months before sustaining any

fractures on her left tusk, the majority of this paper focuses on the right tusk. However, similar techniques, thought processes, and treatments were employed with the left tusk.

Tusk Presentation and Desensitization Training

The husbandry and veterinary team at The Sanctuary (henceforth known as "the team," or "caregivers/veterinary staff") approached Flora's tusk management from multiple angles, which will be explored in the remainder of this paper. These methods happened in conjunction with one another in most cases, depending on Flora's comfort and confidence in allowing the treatments (as well as the testing and problem solving involved in training sessions and product research). Each strategy (desensitization, radiograph positioning, and epoxy application) will be detailed in a separate section, but these methodologies worked best when used together for long-term treatment and monitoring. Flora's behavioral repertoire is vast, including several pre-requisite behaviors that were critical in treating her tusks. She was already established in tusk examinations, which included presentation of the tusk on a horizontal bar [Figure 1] and allowing palpation of the tusk/sulcus, pressure/knocking on tusk, and lifting of the sulcus. This behavior was used in every epoxy application as well as any cleaning, examination, and photography of the tusks (to track new fractures or growth over time). Additionally, tusks could be examined from a "trunk up" position, in which the elephant lifts their trunk and touches it to their forehead or a "trunk wrap" position, in which an elephant wraps their trunk up and through a high horizontal bar [Figure 1]. This positioning was helpful in cases where the fractures were on the medial aspect of the tusk and hidden in a "traditional" presentation.

Figure 1. Traditional tusk presentation on vertical bar (left), used for tusk examinations as well as previous radiographs (as pictured), and tusk view from "trunk wrap" position (right).

In conjunction with radiographs and epoxy treatment (detailed in the following sections), the husbandry team worked on desensitization training for a variety of stimuli, equipment, and scenarios. This training was focused on ensuring Flora's comfort for treatment of the fractures, as well as increasing the number of tools in the toolbox that would allow the team to clean, examine, and treat Flora's tusks. Table 1 shows a list of the initial desensitization goals made for Flora in 2022 in preparation for future tusk treatments. This desensitization training began prior to knowing exactly how the team would attempt to treat Flora's tusks long term. While some

goals on the list proved to be less useful than others, the team succeeded in building Flora's resiliency to what would be her future treatment plan. Retrospectively, the most critical parts of this training were incorporating multiple technicians, epoxy desensitization (smells, tools, techniques), Dremel use, and increased duration of tusk presentations. The team steadily incorporated more of these items into Flora's training routine, taking cues from her behavior on when to advance to the next stage in the process and/or add a new stimulus. Flora readily participates in training, so the team was able to advance to new steps relatively quickly.

While being two of the most critical aspects of desensitization training, adding in new/multiple technicians coupled with increased duration of the presentation proved to be the most difficult. Care had to be taken to ensure reinforcement values were high and combinations of technicians were well trained, worked around Flora frequently, and were comfortable and confident in completing the treatments while adhering to strict safety protocols. Novel food reinforcements before and after sessions appeared to be very valuable and helped decrease instances of aggression during sessions and allow for multiple technicians to work in close proximity to Flora's face and tusks. In addition, the team had to be flexible in being willing to switch around roles just prior to or in the middle of a session in order to create the combination of trainers and technicians that would provide Flora with the most comfort that day. Dremel desense was the easiest goal to complete, and even with a newer, high speed Dremel in 2024, Flora showed calm and confident behavior in just a few sessions. The Dremel proved helpful in smoothing the edges of new fractures to prevent future splintering and risk of subsequent longitudinal fractures.

Stimulus	Category	Goal
High pressure hose	Tactile	Cleaning/flushing
Flashlight	Visual	Better visual of tusk in darker spaces
Second technician*	Tactile, visual, auditory	Complete treatments more effectively
Hair dryer	Tactile, auditory	Dry tusk before/after epoxy
Strong smells (alcohol)*	Olfactory	Clean tusk before epoxy
Continuous sulcus lifting*	Tactile	Protect skin during epoxy cure time
Paint brush**	Tactile	Cleaning/potential product application
Epoxy gun/tip*	Visual, tactile	Epoxy application
Dremel	Tactile, auditory	Sanding down rough edges
Bandage application**	tactile	Mimic potential casting material
Cup/mold**	Tactile, visual	Potential cast/mold for cap

Table 1. A list of desensitization goals for Flora's tusk treatments. Items with one asterisk (*) were the most useful. Items with two asterisks (**) have not yet been completed or were deemed not necessary at the time.

Radiograph Training

After the inciting class I fracture of Flora's right tusk on January 30, 2022 [Figure 2], the team met to make a plan to provide support to the fractured area and view the fracture's proximity to pulp cavity via radiographs. Flora was already trained for radiographs in a "traditional" tusk presentation on a horizontal bar, so initial radiographs were taken on February 2, 2022. These, as in previous radiographs, yielded limited view of the fractured area and inconclusive diagnostics as to the fracture's proximity to pulp cavity [Figure 3]. After this, the team met to discuss alternative positioning to achieve more diagnostic radiographs. As per The Sanctuary's training program, a single caregiver was assigned as the trainer for the behavior in order to maintain consistency throughout the process. In addition, a single technician was assigned to hold the radiograph plate, and the veterinarian and veterinary technician would work the generator and press the button to capture the images. The training of the "new" tusk radiograph positioning began less than one week later on February 8, 2022. The behavior was initially trained only on her right side due to the presence of the fracture and to build confidence in the behavior before generalizing it to her other side. The goal for the new positioning was to place Flora's tusk in a "hanging" position so the tusk was in an open space, not resting on a bar, to allow for better access for the radiograph plate.

Figure 2. Initial Class I fracture sustained by Flora's right tusk on January 30, 2022.

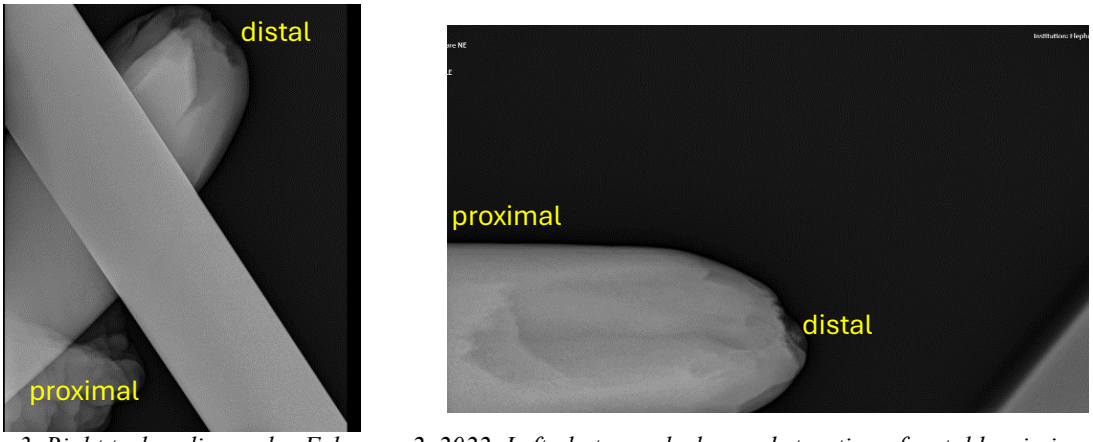

Figure 3. Right tusk radiographs, February 2, 2022. Left photograph shows obstruction of metal bar in imaging. Right image shows incomplete view of tusk.

The prerequisite behaviors for the new tusk radiographs were as follows: “lean in” (side of body flush against the barrier), “come in line” (move from current position to face trainer), “back” (moving one step back from current position), “trunk wrap” (trunk lifted above head and wrapped through the barrier on a horizontal bar), “reach” (move tip of trunk downward from trunk wrap position), and “steady” (pause/hold the position). Training took place at a training wall, equipped with horizontal bars and several ports or openings that allow for different body positioning. The center port in the training wall had adjustable horizontal bars that can be opened or closed. For this behavior, the top bars were opened to allow access to the tusk, and the bottom bars were closed to provide additional protection to the radiograph team [Figure 5]. The training of the behavior started with generalizing Flora’s “come in line” trunk wrap to be done from a right-side lean in position as well as lowering the height of the trunk to make sure the tusk was still low enough to be accessible by the radiograph equipment. The trainer made small adjustments to Flora’s body positioning (utilizing “back,” “lean in,” and “come in line”) over the course of shaping the behavior in order to idealize the location of Flora’s tusk in the training wall opening. A target pole was used to give Flora’s trunk something to lightly hold onto, cuing “reach” as needed to re-position the trunk itself. This gave her clear information as to the position of her trunk through the procedure. In addition, a small vertical bar was welded in the training wall to allow something for Flora to use as a visual for correct trunk placement and positioning.

After Flora was confident in the new trunk wrap positioning, the team began incorporating the plate technician. Unsure as to what Flora’s reaction to the equipment near her face in the training wall opening would be, the team decided to use a mock radiograph plate (plastic rectangular lid or a small dry erase board) that mimicked the size and shape of the actual plate. Over the course of several sessions, the team progressed through the desensitization process, starting with the plate just near Flora’s face and graduating to touching her tusk with the plate, putting the plate under her tusk, and pushing the plate further under her tusk where it touched her trunk and sulcus. Highest reinforcements were given for calm behavior and holding the trunk wrap position and tusk still until the trainer released her. Flora excelled with this behavior and eventually learned to present her tusk further through the opening to allow for better access. The final step in the process was to incorporate the generator and “button pusher” required to take the image (Note: due to the generator technician needing to fully extend their arms upwards, a third technician was required to approach with the radiograph team to take the image). These steps were completed in a similar pattern to incorporating the plate technician, starting with the generator and button pusher walking towards Flora, then raising their hands, and then utilizing a box as a mock generator.

After the start of the training process for the new radiograph position, Flora sustained two more class I fractures on her right tusk, on February 17th and 19th, 2022, in which a mobile piece from the previous fracture was dislodged and additional fracture occurred [Figure 4]. On March 9, 2022, just over 5 weeks after her first class I fracture, the team obtained successful radiographs in the new positioning [Figure 5]. Flora calmly held for multiple images to be taken throughout the session, receiving reinforcement in between each image.

Figure 4. Flora's right tusk on February 19, 2022 after mobile fragment was dislodged (outlined in red in the left image) and additional class I fracture was sustained (right, and outlined in blue on the left image).

Figure 5. First radiographs completed on Flora's right tusk in the "new" positioning on March 9, 2022. From left to right: plate technician, generator technician, button pusher, and trainer.

The team has continued to monitor Flora's tusks with routine radiographs. Her most recent radiographs, on April 5, 2024, indicate no visible pulp cavity, meaning Flora's pulp is retracted into her sulci. This is good news for the long-term prognosis of Flora's class I fractures. Figure 6 (below) shows two radiographs and the reduction in size of the fracture defect on Flora's right tusk from May 4, 2022 to April 5, 2024.

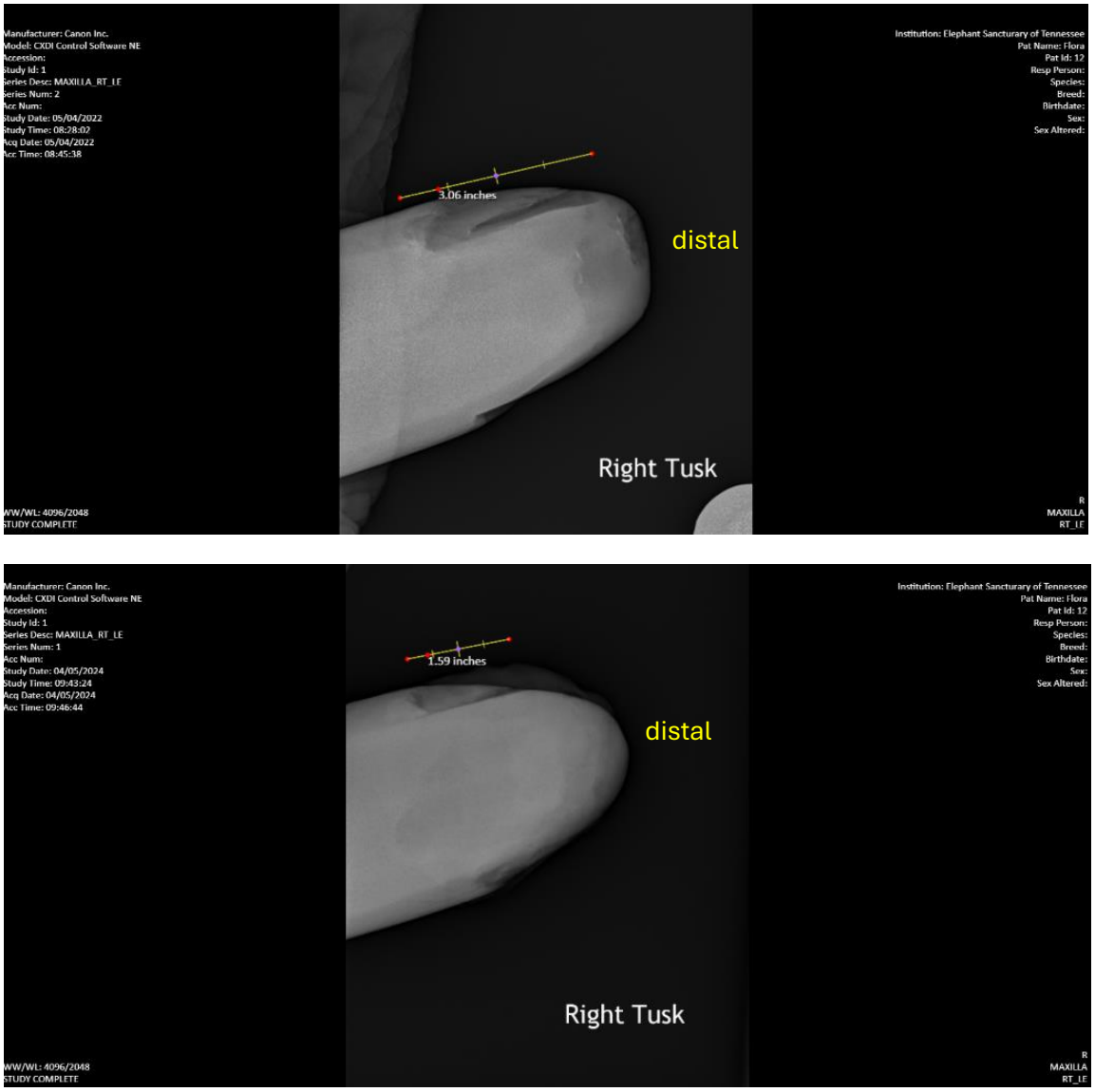

Figure 6. Top image shows the initial defect to be approximately 3.06 inches in length on May 4, 2022. Bottom image shows the same defect to be about 1.59 inches in length on April 5, 2024.

Over the course of the next two years, the team was able to incorporate new trainers and technicians into the behavior, ensuring that only one team member was changed with every new session. For example, a new plate technician was added while trainer and generator technician remained the same. Afterwards, a new trainer could learn the behavior while the technician team remained the same. Only after a person completed multiple desensitization sessions and an official radiograph session was another person able to be transferred into a new role. Currently, the team has three trainers and four plate technicians that can be involved in any combination in this behavior. In addition, only veterinary staff (two members) operate the generator and any staff member that works with Flora (eight members) and is trained in radiograph safety can be the third technician to press the button to take the image. This team depth serves two purposes: it increases Flora's resiliency of performing difficult behaviors with different people and allows for more team flexibility on when radiographs can be taken. The team also began working on left tusk radiograph positioning in August 2022, and her first radiographs in this position were

obtained on November 1, 2022. When the left side was initially being trained, the team reverted to the original trainer for the behavior, but now all three trainers can train both sides.

Increase in radiograph frequencies coincide with fracture incidences and/or presence of highly mobile pieces at risk for further chipping or more severe fractures. Radiographs were obtained on the right tusk seven times in 2022, three times in 2023, and once thus far in 2024. Flora sustained a minor fracture to the left tusk on December 20, 2022, followed by additional fractures in January 2023, May 2023, June 2023, February 2024, and April 2024. Radiographs were obtained on the left tusk twice in 2022, six times in 2023, and once thus far in 2024.

Epoxy Treatment

When Flora first fractured her right tusk in January 2022, the team used a product called Artimud Horse Hoof Putty to pack into the fractures [Figure 7]. This product was easy to apply, but it did not harden or remain in the tusk fracture for very long, requiring almost daily application. In March, the team, headed by veterinary staff, dove into research for an epoxy product that would remain in the tusk longer and provide support and protection for the fractured areas. The first product that was attempted was Vettec Equi-Pak CS™ with the goal to fill the fracture and eliminate the need for daily cleanings and Artimud packings. This product was only used a few times, as it was difficult to apply and did not stick well to the tusk. Before eliminating the use of the Equi-Pak CS™ altogether, staff decided to try it in conjunction with another Vettec product, Equi-Thane Superfast™ epoxy (henceforth known as "Superfast" or "epoxy"), which was applied as a semi-soft paste/liquid and hardens into an "artificial hoof" material. The idea was to use the more malleable Equi-Pak CS™ to fill the fracture and the Superfast to help keep it in place. Figure 8 shows the appearance of the two products together after the initial application on March 29, 2022. This was the only trail conducted with the two products together, as Superfast did not stick well to the moist and tacky Equi-Pak CS™. After this product fell off the tusk, all future epoxy applications were completed with only Superfast.

Figure 7. Flora's right tusk after application of Artimud into the deeper medial fracture. Artimud was the initial topical choice for Flora's tusk fractures.

For the initial months of epoxy trials, due to the novelty of the products, only veterinary staff and management applied the epoxy. Fairly quickly (over the course of the next few weeks), more staff were trained in to be technicians for this treatment, working in order of seniority and experience, and taking into account Flora's comfort during the sessions. Superfast epoxy produces heat (exact temperature unknown, but it is hot to the touch) when first applied, so previous desensitization to allow for lifting of sulcus, multiple technicians, and longer duration

tusk presentations proved invaluable to preventing skin irritation and improving the quality of the application. In addition, gloves are critical for technicians to prevent thermal burns on skin. The product also sets faster and produces more heat when ambient temperature is above 85 degrees Fahrenheit, so working quickly is key.

Figure 8. Appearance of right tusk after application of Equi-Pak CS™ (green product) followed by two thin coats of Equi-Thane Superfast™ epoxy (white product).

Figure 9 below shows all of the equipment required to complete each epoxy application. Application works the best when the tusk is as clean and dry as possible. While a garden hose or other running water with a brush can be used if the tusk is very dirty, additional manual drying, hair dryer, and/or time is needed to ensure the tusk is very dry before proceeding. Typically, the team utilized isopropyl alcohol and a toothbrush to clean the tusk, along with 4”x4” gauze to clean/dry the tusk quickly before applying the epoxy. Each coat initially sets in about 30 seconds, after which the product cannot be pumped through the applicator tip, and it will be difficult to smooth into an even layer. Full application and spreading must be completed in this time frame. Following the initial 30 seconds, the product takes an additional 2 – 2 ½ minutes to set firmer and cool down to a temperature that will not irritate skin. At this time, the product is still slightly pliable if the elephant presses the tusk on the steel fencing, but otherwise it is fully set. After each coat, the trainer could either choose to allow Flora a “break” to release her tusk or proceed to a second coat or the other tusk, if necessary. Over the course of epoxy applications, staff has learned that isopropyl alcohol sprayed on the epoxy after application helps speed up cooling and Wonder Dust, a powder typically used as a blood coagulant, helps if the product is slightly sticky, preventing the product from irritating or sticking to the sulcus.

Figure 9. Materials needed for epoxy application.
From left to right: toothbrush, isopropyl alcohol in spray bottle, epoxy applicator tips, Wonder Dust, popsicle sticks (optional, for spreading product), 4"x4" gauze, gloves, epoxy, and epoxy gun.

From June to December 2022, epoxy was applied a total of ten times to Flora's right tusk, utilizing Artimud intermittently to cover any areas where the epoxy might have chipped off until epoxy could be re-applied. December 2022 is also when Flora sustained a new fracture in her left tusk, so staff began employing epoxy treatment for the left tusk as well. In 2023, epoxy was applied 49 times to the right tusk and 47 times to the left tusk, which is an average of approximately one application per week. From January to June 2024, epoxy was applied 19 times (once every 9.6 days) to Flora's right tusk and 32 times (once every 5.7 days) to her left. The longest bout of time that epoxy remained in the deeper fracture in Flora's right tusk was between September 9, 2022 and March 1, 2023. Not every coat of epoxy that was recorded was a "full" coat (starting with a clean, bare tusk), as sometimes only parts of the epoxy came off. This meant that epoxy was often re-applied over itself to reinforce existing applications.

In January 2023, the team took the applications one step further and began employing 2-3 thicker coats of epoxy on both tusks, focusing mainly on the right tusk. Special care was taken to cover not only fractured areas but the distal (end) portion of the tusk that would sustain the brunt of an impact from use and wear. This meant that while the epoxy applied on September 9, 2022 remained in the deeper fracture, it was reinforced during that time with subsequent thicker coats. Figure 10 is a representation of what 2-3 thick coats of Superfast epoxy looks like on Flora's right tusk. The hope was that these thicker coats would act as a temporary cap, of sorts, without having to go through the process of creating a mold and applying a permanent cap. A bonus of Superfast epoxy is that radiographs can be taken even when Flora's tusk is covered with epoxy, so application did not inhibit other diagnostics.

Figure 10. Three views of thicker coats of Superfast epoxy on Flora's right tusk. January 31, 2023.

As of 2024, Superfast epoxy is still the main treatment for Flora's tusk fractures, although several other products have been researched and tested, including sailboat repair tape, Kevlar tape, and casting material. Due to the significant overlap between Flora's tusks and sulci, all of these products raised concerns of skin irritation, lack of efficacy, human safety during application, and elephant safety if the products came off and were ingested. Therefore, none of these products have been employed on Flora's actual tusks. Intermittent product research is still being conducted to determine future preventative treatment options, which will be discussed in the following section. The number of fracture incidents, radiographs, and epoxy applications, by tusk, is summarized in Table 2 below. Increase in radiograph images correlate to fracture incidents, while number of epoxy applications correlate to fracture incidents and the increase of epoxy use as a preventative measure for Flora.

	Fracture incidents	**Number of radiograph images**	**Number of epoxy applications**
Right tusk 2022	10	7	10
Left tusk 2022	1	2	2
Right tusk 2023	0	3	49
Left tusk 2023	3	3	47
Right tusk 2024 (Jan-June)	1	1	19
Left tusk 2024 (Jan-June)	4	1	32

Table 2. Number of fracture incidents (any chip or fracture recorded in husbandry records), number of radiographs taken, and number of epoxy applications completed. Not all incredibly minor chips were noted, so the numbers might slightly underrepresent instances in which very small tusk pieces came off.

Conclusion and Future Work

Throughout the history of Flora's tusk fractures, frequent and proactive desensitization training has proven to be immensely useful in increasing Flora's confidence with epoxy treatments and allowing for vital diagnostics. The more confident and comfortable Flora is with staff working with her tusks, the more accessibility and flexibility the team has to complete treatments under behavioral restraint. Because steel fencing cannot be eliminated from Flora's environment, management strategies that focus on decreasing frustration and instances of aggression are critical to the overall goal of preventing future fractures. These strategies include, but are not limited to, strategic implementation of environmental enrichment to avoid frustration (nothing at tusk height or above), caution and high reinforcement levels when incorporating new trainers and

technicians, thorough staff training of Flora's behavior and aggression precursors, active desensitization training for new gates and other facility modifications, and frequent monitoring of new social interactions. During epoxy treatments, Flora still receives high value of reinforcement throughout, and care is taken by the trainer to drastically reduce instances of end-of-session aggression or frustration (which, along with risk of tusk damage, can ruin the newly applied epoxy). Previous literature shows a significant association between commitment to these management strategies and a decrease in fracture recurrences (Rose et al., March 2022). Between 2022 and 2024, the instances of fractures in Flora's right tusk have decreased, with zero fractures recorded in 2023 and one minor fracture recorded in 2024. The larger fracture defect sustained by Flora's right tusk in January 2022 has reduced in size by approximately 1.47 inches as of April 2024. The team hopes the same trend of reduced fracture incidents and increased growth will continue with both tusks for years to come.

The Sanctuary team currently conducts bi-annual radiographs on both of Flora's tusks, with additional radiographs taken as needed if future fractures occur. These were reduced in frequency from monthly and quarterly as success with epoxy and tusk growth continued. Tusk caping has been discussed amongst the team, and research into logistics specific to Flora have continued off and on over the last two years. Capping would require 360-degree access to Flora's tusk as well as significant time holding that position in order to obtain an accurate mold. While this could still potentially be a treatment option, there are not currently strong indications that this would be successful or warranted in Flora's case. As of the time this paper was written (July 2024), the team continues to utilize epoxy, along with bi-annual radiograph monitoring, Dremel desensitization, and strategic behavioral management to monitor current tusk defects and prevent future fractures. Flora's case is vital to many facets of information gathering and sharing regarding the treatment of class I tusk fractures, including changing the way The Sanctuary practices both proactive and reactive tusk care. The team has obtained similar tusk radiograph images on four other African elephants at The Sanctuary to date. The hope is also that this case, and the work involved, provides insight, strategies, and potential products to any other facility looking for new approaches and techniques for the treatment of class I tusk fractures in African or Asian elephants.

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Product information:
Artimud horse hoof putty: available at multiple stores and online retailers

- Sample website: https://redhorseproducts.com/shop/hoof-care/artimud/

Vettec products: available online or in store. Distributed by Farrier Product Distribution, Inc. in United States and Canada

- Website: https://vettec.com/products

Wonder Dust wound powder: available at multiple stores and online retailers

- Sample website: https://www.farmvet.com/Wonder-Dust?location=&quantity=1&healthcare-size=58&CATARGETID=120037530000029963&CAPCID=557094009728&CATCI=dsa-663381173512&CAAGID=132668114281&CADevice=c&gclid=CjwKCAjwnei0BhB-EiwAA2xuBscLVC1twNIWanwSeWGoAwqk2gv_rGz2MqNKpErg3lWW6_ga5jh4mxoC9FsQAvD_BwE

Maybe the Lioness' Don't Have to Sleep Tonight: Cooperative Care Contraceptive Implant Training in African Lions (Panthera leo)

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Administering a contraceptive implant using chemical immobilization and physical restraint can cause unneeded stress to large felids. Staff at Utah's Hogle Zoo decided to implement an alternative approach using cooperative care training. Cooperative care training encourages animals to not only tolerate handling and husbandry procedures, but also to be an active, willing participant in these experiences without needing chemical or physical restraint. Utah's Hogle Zoo houses 2.3 African Lions (Panthera leo). The pride is currently not recommended to breed through the Species Survival Plan and are housed in two groups of 2.0 males and 3.0 females. To help regulate hormone and stress levels between the two groups of animals, 0.3 African Lions "Sela", "Calliope", and "Nobu" are currently on contraceptive deslorelin implants. The St. Louis AZA Reproductive Center recommended that the implants be re-administered every two years to female lions. Due to the frequency of the contraceptive implants, a cooperative care training program was initiated with the female lions, training them to voluntarily accept the implants. The procedure involves the lioness' remaining still between 10-15 minutes, training for shaving of their fur, desensitizing to a spray topical anesthetic and injected anesthetic, insertion of three 9.4mg deslorelin implants, and finally some tissue glue to seal the site of implantation. The training allowed for successful voluntary implantation of the contraceptives without chemical or physical restraint. In 2023 "Sela" and "Calliope" each received three separate implants in their right hip without any complications. "Nobu" received her implants spring 2024.

Maybe the Lionesses' Don't Have to Sleep Tonight

Cooperative Care Contraceptive Implant Training in African Lions (*Panthera leo*)

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Abstract:

Administering a contraceptive implant using anesthetic procedures or physical restraint can cause unneeded stress to large felids. Staff at Utah's Hogle Zoo decided to implement an alternative approach using cooperative care training. Cooperative care training encourages animals to participate in handling and husbandry procedures and to be active, willing participants in these experiences without the need for anesthetic procedures or physical restraint. Utah's Hogle Zoo houses 2.3 African Lions (*Panthera leo*). The pride is currently not recommended to breed through the Species Survival Plan and are housed in two groups of two males and three females. To help regulate hormone and stress levels between the two groups of animals, the three lionesses "Sela," "Calliope," and "Nobu" are currently on contraceptive deslorelin implants. The St. Louis AZA Reproductive Center recommends that the implants be re-administered every two years in female lions. Due to the frequency of the contraceptive implants, a cooperative care training program was initiated for the female lions by training them to voluntarily accept the implants. The procedure involved the lioness' remaining still between 10-15 minutes, training for shaving of their fur, desensitizing to a spray topical anesthetic and injecting lidocaine, insertion of three 9.4mg deslorelin implants, and finally applying tissue glue to seal the site of implantation. The training allowed for successful voluntary implantation of the contraceptives without anesthetic procedures or physical restraint. In 2023 "Sela" and "Calliope" each received three separate implants in their right hip without any complications. "Nobu" received her implants summer 2024.

Introduction:

African Lions (*Panthera leo*) are found on the African continent and split into two different subspecies; West and Central African Lions (*Panthera leo leo*) and Southern African Lions (*Panthera leo melanochaita*). Currently the Utah's Hogle Zoo (UHZ) is home to 2.3 Southern African Lions housed in two separate prides of two males and three females. African Lions are considered vulnerable in their environment due to habitat loss, prey redistribution, and retaliation killing for livestock (Packer 2023). Being large obligate carnivores, their diet consists of medium to large ungulates but have been known to scavenge (Packer 2023). Lions are considered a keystone species because of their ability to take down large ungulates with the use of their social groups and cooperative hunting techniques (Packer 2023). These social groups are called prides, which are unique to lions, they are the only social species of large felids with the exception of male cheetahs (Packer 2023). Through conservation efforts both done in the wild and in human care, lion genetics are preserved, and some wild populations are increasing. The Species Survival Plan (SSP) is responsible for preserving and diversifying the genetics in captive populations of animals. The lions at UHZ had a successful breeding and birth in 2016. Presently, they are not recommended to breed through the SSP; the females are given contraceptives to regulate hormone and stress levels. From 2018 to 2021, the lionesses received contraceptive implants through anesthetic procedures. In 2023 and 2024, the use of cooperative care training was implemented to get all three females to voluntarily receive contraceptive implants. According to the St. Louis AZA Reproductive Center the implants must be re-administered every two years

(*Contraceptive Products and Guidelines: Felids* 2023). To reduce the frequency of anesthetic procedures on each lioness, Utah's Hogle Zoo focused more on cooperative care training for 0.3 African Lions. Cooperative care training is defined as training an animal to not only tolerate handling and husbandry procedures, but to be an active, and willing participant in these experiences (Dixon et al. 2024). Cooperative care is commonly used in zoos for large or potentially dangerous animals that cannot be safely handled without the use of chemical or physical restraint (Dixon et al. 2024). In this paper, the plans and procedures to successfully implant each female with cooperative care training will be presented. Although all females were trained the same, each varied slightly based on training performance and individual behavior.

Materials:

Table 1.1: Key Items for Implant Training

Trainer Items	Veterinary Items	Miscellaneous Items
Reinforcers	Cordless, noiseless clippers	Rolling stools
Feed stick	Saline needle syringe 20 gauge	Lion scale/ squeeze with removable bars 87"x43"x20"
Whistle	Sterile pad or gauze	Ovaban® for before and after the implantation
Feed pouch or bin	Topical disinfectant	
Blunt practice needle	Topical anesthetic spray	
Dry needle syringe 20 gauge	Lidocaine	
Corded, full sound clippers	9.4mg deslorelin implants	
	Tissue glue	

Table 1.1 This table includes items that were used in the training and implantation of the contraceptive implants.

Methods:

Cooperative care implant training involved several different types of training and desensitization for it to be successful for all the lionesses. With the methods described below the lionesses voluntarily and without complications received all their contraceptive implants. Prior to the implant training the lionesses had several established foundational behaviors. The foundational behaviors each lioness had established to accomplish the implant training were to be de-sensed to the lion squeeze and be comfortable laying down in it. This was needed to get proper positioning for the implants to be administered in the right hip.

Figure 2.1 Lioness lying in squeeze with one safety bar pulled up

Antecedent arrangements of the training included several accommodations to help the lionesses and the staff members to be comfortable during training. Training was done in the same order that would be

done during the day of the implantation. The other lions and lionesses were locked outside or away from the lioness training; this improved the focus of the lioness being trained and allowed for a more secure environment for the staff to work in. Once the first lioness was done with training, the second lioness would be shifted to the squeeze to be trained. The squeeze was always open at one end so the lioness could leave session if she chose to terminate the session. The main use of the squeeze was to allow the veterinarian to work safely and not have concerns about the lioness turning abruptly. The squeeze also has removable safety bars that could be individually removed to allow for a larger opening for the veterinarian to work. Figure 2.1 illustrates the lioness positioned in the squeeze with a safety bar pulled up. These arrangements allowed for a greater chance of success in the cooperative care implant training.

Behaviors trained and desensitization training in preparation for the implantation were; training with a veterinary staff member present, injection training in the squeeze, and clipper training for fur shaving. Our first steps were to add a second known keeper to the training sessions; many training sessions previously were done with only one trainer present at the squeeze. The process of adding a second person started with adding a known keeper to the training sessions, then progressing to relief keepers being the secondary, and finally adding veterinary staff to the training. The second person would start by standing away from the squeeze; then they moved to a seated position on the rolling stools; and finally they sat next to the squeeze while the primary trainer bridged and reinforced. The rolling stools were used to be able to quickly move away from the lioness, if needed. The final behavior had the veterinarian seated with the ability to work on the lioness in the squeeze with the primary trainer bridging and reinforcing.

In tandem with this progression, the primary trainer was training "touch" and injection in the squeeze. The injection behavior was a two-person trained behavior with the primary trainer bridging and reinforcing; and the secondary person would be touching, injecting, or manipulating the lioness' skin. The "touch" behavior evolved into the final injection behavior with the use of; blunted needle pokes, progressing to dry needle pokes, and finally saline needle injections. The final injection behavior done by the veterinarian would involve several different injections; one subcutaneous and intradermal injection for the lidocaine and three subcutaneous injections to place the implants. The three 9.4mg deslorelin implants were injected with approximately an 11-gauge needle, and the same injection site was used to implant the contraceptives at 6, 9, and 12 o'clock. Figure 2.2 displays the veterinarian injecting lidocaine and implanting one deslorelin implant.

Figure 2.2 Veterinarian injections of lidocaine on the left and one deslorelin implant on the right

In order to have a clean injection site and to provide the veterinarian with proper visuals, the fur on the right hip was shaved. To train this behavior, the secondary person would operate the clippers; keepers found it easier to use cordless, noiseless clippers. The lionesses trained with

both corded, full sound clippers and cordless, noiseless clippers. The clipper desensitization training started with having the clippers be present while training the lioness; followed by turning on the clippers during the training; then touching the clippers to the fur. The final behavior was shaving the patch of fur that allowed the injection site to be clearly visible for the veterinarian and to maintain a sterile environment. As new behaviors were added to the training the primary trainer and veterinarian worked the behaviors in sequence. Training occurred three to four times a week, this was to aid in developing the relationships between the primary trainer and the veterinarian with the lionesses. The consistency of training also allowed for the lionesses to be familiar with what to expect on the day of the implantation.

The final cooperative care contraceptive implant training was done in eight steps:

1) Positioning the lioness in the squeeze

2) Shaving the fur for the implantation site

3) Applying topical disinfectant and anesthetic spray

4) Injecting lidocaine and allowing it to sit for one minute

5) Applying a second application of the topical disinfectant

6) Implanting the three deslorelin implants

7) Applying tissue glue to the site

8) Applying a final application of the topical disinfectant

The lionesses were placed on a Ovaban® hormonal treatment a week leading up to the day of the implantation and a week after. At completion of the implantation the lioness would only have access inside, for a few hours, to allow the site to maintain the tissue glue seal properly.

Results:

Case Study 0.1 “Nobu”

Figure 3.1 Nobu receiving implants in 2022

0.1 African Lion “Nobu” age 11, was originally trained for the cooperative care implant behavior in 2022 and successfully received her implants. Her success allowed UHZ staff to refine the cooperative care implant training to have better success for her and the other lionesses. She participated again in summer 2024 with the refined and refreshed training. Figure 3.1 captures the training done in 2022. Nobu is the matriarch of the lioness pride and actively participates in training. Her temperament is calm and attentive when keepers are present, and she does not show agitated behavior when new people are present. Her training of adding the veterinarian varied in that the primary trainer and the veterinarian would trade places until Nobu was comfortable with the veterinarian.

Case Study 0.1 “Calliope”

Figure 3.2 Calliope receiving implants 2023

0.1 African Lion “Calliope” age 8, Nobu’s daughter, first went through implant training in 2021, was successful but was not voluntary and required full use of the squeeze to complete the implantation. The first attempt, while unsuccessful voluntarily, gave valuable information on how best to train her for the following implants and the training resumed in 2023. Figure 3.2 shows a wide shot of Calliope’s implant training in the squeeze. Calliope is an active participant in training but showed some agitated behavior when a second person was added, primarily the veterinarian. She trained with several keepers before the veterinarian was added. The veterinarian had many sessions of just standing near the squeeze until Calliope remained in session without breaking. When the veterinarian began working on Calliope, she would often move her tail out of the bars and it caused her to hit the veterinarian, so trainers also worked on calm behavior while in the squeeze to help extinguish the tail flicking. On the day of the actual implantation, the primary trainer and veterinarian had to end the session due to Calliope’s refusal of reinforcers from the trainer and backing out of the squeeze. Calliope’s appetite was satiated, and she no longer wanted reinforcers whether they were normal Nebraska Brand® meatballs or high value horse chunk. The tissue glue was administered, and the trainer and veterinarian ended the session with only two implants being implanted. The next day Calliope successfully received the final implant. The trainer and veterinarian discussed giving the lioness being trained the ability to leave the squeeze while the lidocaine took effect, which takes one minute. This was to decrease the amount of the reinforcers used to hold the lionesses in the squeeze so that they would not get satiated before the end of the session.

Case Study 0.1 “Sela”

Figure 3.3 Sela receiving implants 2023

0.1 African Lion “Sela” age 11, Nobu’s sister, was first trained in 2023 and previously only received her implants through anesthetic procedures. Figure 3.3 demonstrates Sela successfully and voluntarily receiving one of her implants. Sela’s temperament is more alert, and she shows more agitation toward newer people when training. She often breaks from sessions to pace in front of the trainer when conducting regular training sessions. Sela showed the most agitation to a secondary person being present when training. This was evidenced by her continuous backing out of the squeeze when the secondary approached. The behaviors she exhibited in the presence of the secondary were breaking from the session and lunging at the second person. Several sessions were done with keepers and veterinary staff to allow her to feel comfortable in the squeeze, but the agitated behaviors still occurred. To help mitigate these

behaviors and to allow her to be more comfortable, she was given 225mg trazodone for situational-related anxiety twice daily throughout the training. The behaviors were lessened and eventually extinguished. Once she was comfortable with all keepers, the veterinarian was added. Regression in adding the veterinarian occurred. To allow a positive relationship to be built between Sela and the veterinarian, training switched to having the veterinarian feed and build a relationship every session. This step improved behavior, and the duration of Sela remaining in the squeeze. Once the relationship was built, the veterinarian was able to sit near the squeeze and perform all the behaviors needed for the implantation. To maintain a positive relationship throughout the training, the veterinarian fed Sela after every session.

Conclusion:

The final cooperative care contraceptive implant training success for each lioness was carried out through; several months of training, maintaining and strengthening relationships of the lionesses with the veterinarian and key trainers, and consistency of training. The primary trainers and the veterinarian worked several times a week for many months to train the behaviors. Cooperation and collaboration were required of the entire Africa team and veterinary staff to be able to accomplish this cooperative care training. Scheduling was carefully considered for both the animal care team and veterinary staff to accommodate these sessions. Each individual lioness also had her own accommodations to help improve her training performance and maintain positive relationships with staff members. All these factors were monitored closely to ensure a positive experience to proceed with training in the future. With the success of all lionesses participating voluntarily in their cooperative care implant training in 2023 and 2024, Utah's Hogle Zoo will continue the training while the lionesses remain on their contraceptives. To have the success of this procedure done after many years of anesthetic procedures shows that lionesses, no matter the temperament, age, or training level, can achieve complex husbandry behaviors. This change improved trainer and veterinarian relationships with the lionesses, which will allow future medical behaviors to be performed with cooperative care training.

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Products:

Nebraska Brand®: Central Nebraska Packing, Inc. P.O. Box 5502800 East 8th Street, North Platte, NE 69103-0550: https://nebraskabrand.com/products.htm

Ovaban®: Merck/ Schering-Plough Corporation, 2000 Galloping Hill Road, Kenilworth, NE, 07033

Photos:

Taken by Author and Michelle Olandese

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The Curious Case of Fiona the Chimp

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Kerry Patterson

In 2022, the Dallas Zoo received two new chimpanzees on a recommendation from the Chimpanzee Species Survival Plan (SSP)- Fiona (32) and JB (34). Shortly after their arrival, quarantine staff noticed several bouts of vomiting and regurgitation from Fiona. Over the next few months, Fiona continued to present these symptoms with concurrent presentation of chronic diarrhea, lethargy, and abnormal ambulation. Diagnostic procedures were performed under anesthesia in June 2023; results indicated inflamed gastrointestinal walls, which lead to a diagnosis of gluten intolerance and subsequent reformulation of the troop diet.

In this presentation we will discuss the Zoologist and Management decisions leading up to the procedure, the many diet changes we implemented for the chimp troop, and provide an update post-secondary procedure.

The Curious Case of Fiona the Chimp

Sara Bjerklie, Assistant Zoological Manager

Dallas Zoo

Dallas, TX

In 2022, the Dallas Zoo received two new Chimpanzees on a recommendation from the Chimpanzee Species Survival Plan (SSP)-Fiona (32) and JB (34). Fiona is very playful and often initiates play with other troop members, she is most easily recognized by her constant blowing of raspberries. JB is always eager to train, seeks attention and is a catalyst for dynamic troop behaviors. Both girls arrived in Dallas in early April of 2022 and were quarantined in the hospital's Great Ape/Carnivore ward. Once quarantine was completed, introductions to the rest of the troop occurred and we had a new troop of 2.4. Within a couple of weeks, animal care staff observed and reported possible vomiting behaviors from Fiona. Before their arrival in Dallas, we received periodic reports of dry heaving from Fiona which had increased in the past couple of years, and was noted most often in the morning. By June 2022, only a couple of months after quarantine, staff noted the first instance of vomit found during cleaning since JB and Fiona were added into the troop and observed continued vomiting/dry heaving from Fiona. This behavior was typically only observed in the morning and not dependent on if she had received a food item or not. In discussion with management and veterinary staff Fiona was placed on a regime of omeprazole, famotidine, and sucralfate to help alleviate any tummy issues (i.e. gastritis) she may have been exhibiting. Unfortunately, after a lengthy trial period of the medication staff were still observing the vomiting behavior in the morning.

Fast forward to January 2023, and in the coming month, animal staff would observe additional behaviors we started tracking. While Fiona still presented with occasional vomiting there was an increase in chronic diarrhea (grade 6 fecals). Fiona was placed on loperamide and Endosorb Tablets (anti-diarrheal) with the hope to firm up feces. Animal staff were able to observe Fiona in the mornings and monitor fecal quality; they would observe a slight improvement of fecal quality while on medication and a decline once it was discontinued. Samples were also collected and sent out for parasitology, with negative results. In mid-March, Fiona started presenting with a new abnormal behavior: she would demonstrate a hunched back while walking and display an abnormal ambulation. The care team described it as "almost like walking with crutches." This was also often paired with laying on her side during training and eating; this would last for a couple of days and then symptoms would resolve themselves. Consistent notes were taken and reported to management. The case was subsequently discussed during weekly vet meetings and team meetings.

With constant communication to upper management and veterinary staff, animal staff expressed their welfare and well-being concerns regarding Fiona and the continuous behaviors we were observing, specifically grade 6 fecals (very loose, liquid stool and can range from little to no form to pure brown water) and abnormal ambulation. By June 2023, Fiona was also on a constant regiment of Zylkene (milk protein power), sucralfate and prednisone with the hopes this would decrease the frequency of vomiting/regurgitation staff were observing and help with any intestinal inflammation. With all this information in hand, Fiona's annual exam was moved up by a month for a diagnostic procedure, and a gastroenterologist was brought in for a secondary exam.

Fiona's first procedure went exactly as expected and was completed within a couple of hours. Biopsies were taken in various parts of the stomach, esophagus, and rectal area. Initial findings reported that Fiona had an abnormal stomach lining with potential inflammation; chronic diffuse gastrointestinal disease was suspected. At this point, the Dallas Zoo called upon a local specialist, Dr. Nazario, a gastroenterologist. The second procedure, led by Dr. Nazario, resulted in similar findings and a better understanding of what may be going on internally for Fiona. The most notable finding was inflammatory polyps found in the duodenum (first part of the small intestine) and the stomach lining contained blunted, abnormal, and pale villi. The villi are an important part of any membrane surface internally and helps with the passage of nutrients. As it was described to our staff, a normal healthy-looking intestine would have villi resembling finger-like projections; Fiona presented with abnormal villi which were blunted.

Fiona was immediately started on a course of steroids and an elimination diet was discussed with the nutritionist. As we decreased the amount of steroids offered, we noted an increase of abdominal distention and discomfort. By August 2023, she was started on a new steroid (Budesonide) that she has done well on ever since.

Much to our surprise, the results from Fiona's secondary procedure indicated that chronic diffuse gastrointestinal disease was suspected, and celiac disease was possible. To the best of our knowledge, this is the first reported case of celiac disease in chimpanzees, and changed the course of how we would manage our troop.

What is Gluten exactly?

Most people know that gluten is found in wheat, barley, and rye…but what is gluten, exactly? Well, gluten is a protein that is commonly found in the above food items but one of the interesting aspects of gluten is that it is used as a "glue" to give food items their shape. Because gluten can also be found in medications, supplements and vitamins, animal care staff quickly

realized that we would need to thoroughly consult with our nutrition and veterinary teams to come up with a solid plan for managing Fiona's disease.

According to the John Hopkins Medicine website: "Humans have digestive enzymes that help us break down food. Protease is the enzyme that helps our body process proteins, but it cannot completely break down gluten. Undigested gluten makes its way to the small intestine. Most people can handle undigested gluten with no problems. But in some people, gluten can trigger a severe autoimmune response or other unpleasant symptoms."

Diet Changes

With the potential diagnosis of Celiac disease/gluten intolerance for Fiona, the team made the decision to go gluten-free for our entire troop. Because she occasionally engages in coprophagy (consumption of feces), we worried that she could have secondary gluten exposure from the feces of her troop-mates if we did not remove gluten entirely. Instead of performing a slow switch over time, we eliminated any items that may contain gluten—including chow—and worked with our nutrition department to formulate a new diet.

Greens and produce items were increased to accommodate the caloric change from chow but we also needed a way to increase their protein source. Through discussions with the nutrition team, we added in a variety of beans, tofu, and eggs, along with making "protein rolls." While the amounts were decided by the nutritionist, staff worked with our chimps to determine how well they would eat these new items. Over the year, we changed the types of beans offered (black beans, cannellini, garbanzo) and the presentation of eggs (baked, baked with seasoning, hard boiled, etc.). We are still tweaking the diet as we observe additional information (i.e. fecal quality and appetite/taste) from the troop.

Husbandry Changes

Additional husbandry changes also needed to be implemented as staff switched the barn to gluten-free. One of the first implementations was a deep clean of the kitchen and purchasing new cutting boards and utensils (knives, spoons) which may contain gluten from previous food items. Management also purchased an additional microwave for staff use and all keeper utensils needed to be washed in a separate sink to limit any contamination. The second implementation was the removal of any paper bags and boxes that were food related (take out bags, cereal boxes, etc.) that may be used for enrichment. We also adjusted our novel food enrichment and switched all

items to be gluten free and removed straw from our bedding options. An additional change we discovered in the spring was the need to switch our grass seed to rye and clover.

At Dallas Zoo we use a combination of daily logs and Zims (Online platform for data sharing, Zoological Information Management System) to track communication between day-to-day staff and management/veterinarians. To track changes with Fiona, staff created a Zims template (see below) that is filled out daily and uploaded to Zims and keyworded Gluten. This has allowed us to run reports and track any changes we have observed.

0.1 Chimpanzee "Fiona":	Weight:
Swelling-	
Appetite (including preferences/dislikes):	
Vomiting/R&R:	
Fecal quality/ingestion:	
Abdominal distention:	
Gassiness/Discomfort (Please describe behaviors):	
Activity:	
Other:	

1 year later:

Almost a year later, with staff working vigilantly on separation and injection training, we separated Fiona from the troop and performed a recheck procedure with Dr. Nazario. We were immediately able to see that the villi in Fiona's stomach lining were returning to a healthy appearance, demonstrating to us that our diet change and constant vigilance with being gluten free in the building was helping. As a team we are still working on improving our fecal output for the troop by increasing browse and adjusting the diet as needed. Fiona is continuing to do well as a result of the tireless care provided to her by her animal care team, as well as the cooperation and collaboration with multiple departments—both inside and outside of the zoo.

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John Hopkins Medicine website: https://www.hopkinsmedicine.org/health/wellness-and-prevention/what-is-gluten-and-what-does-it-do

Growing Our Knowledge and Colony: Adventure Aquarium's Path to Establishing a Breeding Colony of Little Blue Penguins

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Jennifer Duffy

Utilizing research and observation, optimal conditions were created to ensure successful breeding of Eudyptula minor (little blue penguins) at Adventure aquarium. Two chicks hatched shortly after the colony was established in 2016. The next three breeding seasons, multiple eggs were laid, however none of the eggs resulted in chicks. In 2019, staff set out to analyze information collected from the aquarium's habitat, other institutions with established little blue penguin colonies, and research conditions in part of the species' endemic range; Phillip Island, Australia. Data reviewed included temperature, humidity, nutrition, behavior, light cycle, natural seasonal conditions, and specific reproductive biology to determine a possible cause for the lack of development from fertilized egg to a successfully hatched chick. Based on this information, changes were made that included the size, placement and design of nest boxes, time of year for breeding season, increasing the amount of nesting material provided, and scheduled seasonal changes such as water temperature, air flow and duration of sunlight. Additionally, clutches were separated into parent incubated and artificially incubated eggs to further determine if the habitat impacted success. Eggs placed in the incubator were further studied to track embryo growth. Overall, the increased breeding success in recent years has been attributed to the improved understanding of the species' requirements and the adjustments made to the habitat after researching multiple topics and implementing the findings. These changes led to five successful breeding seasons in a row, resulting in sixteen chicks!

Growing Our Knowledge and Colony: Adventure Aquarium's Path to Establishing a Breeding Colony of Little Blue Penguins

By
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Abstract

Utilizing research and observation, optimal conditions were created to ensure successful breeding of *Eudyptula minor* (little blue penguins) at Adventure Aquarium. Two chicks hatched shortly after the colony was established in 2016. During the next three breeding seasons, multiple eggs were laid, however none of the eggs resulted in chicks. In 2019, staff set out to analyze data collected from the aquarium's habitat, other institutions with established little blue penguin colonies, and research conditions in part of the species' endemic range; Phillip Island, Australia. Data reviewed included temperature, humidity, nutrition, behavior, light cycle, natural seasonal conditions, and specific reproductive biology to determine a possible cause for the lack of development from fertilized egg to a successfully hatched chick. Based on this information, changes were made that included the size, placement and design of nest boxes, time of year for breeding season, increasing the amount of nesting material provided, and scheduled seasonal changes such as water temperature, air flow and duration of light. Additionally, clutches were separated into parent incubated and artificially incubated eggs to further determine if the habitat impacted success. Eggs placed in the incubator were further studied to track embryo growth. Overall, the increased breeding success in recent years has been attributed to the improved understanding of the species' requirements and the adjustments made to the habitat after researching multiple topics and implementing the findings. These changes led to five consecutive, successful breeding seasons, resulting in fourteen chicks!

Background

After researching the species, requirements and importation information, Adventure Aquarium leadership decided to convert an existing habitat to house little blue penguins *(Eudyptula minor)* to help increase the population of the species in the United States. In December 2015, eight penguins arrived at Adventure Aquarium from Taronga Zoo. After completing their quarantine period, the newly renovated habitat opened to the public in January 2016. Having an abundance of African penguin knowledge and prior experience, multiple Bird and Mammal staff members visited or communicated with other facilities to learn about little blue penguin husbandry in the months leading up to their arrival. Much of the advice provided was cautionary in nature and limited breeding information was available to be shared. In December 2016, the remaining two penguins needed to complete the colony arrived from New England Aquarium. At this time the aquarium introduced its unexpected first hatched chick to the colony. A few months after the

new members had acclimated, a second chick hatched in April 2016. The colony then settled in with twelve members and no further chicks were produced, although numerous eggs had been laid. After getting a taste of breeding success, the Bird and Mammal team wanted to determine what was occurring that prevented other hatchings. Starting in 2019, staff were assigned areas of research to discover what adjustments could be made to improve breeding success. The goal for Adventure Aquarium was to contribute to the genetic variability of the overall population within zoos and aquariums.

Research

There were many areas of information collected in 2019 to start the analysis of the current habitat and how it compared to that of other institutions. During the 2019 breeding season, temperature and humidity inside the nest boxes and temperature and humidity of the overall habitat were collected. This data was compared to other institutions to determine if there were distinct differences that may have been contributing to the lack of embryo development. The diet provided to the penguins was analyzed by the veterinary staff to ensure there was proper nutrition, especially the nutrients required during breeding season. Additionally, the penguins' behavior was observed to determine if the nest box spacing and orientation were causing any issues that would create an environment unfavorable to breeding.

The question of whether seasonality and environmental cues impacted breeding success came to the forefront. The timing of breeding season in Australia was researched to determine what environmental cues would need to be present in Adventure Aquarium's habitat to help trigger breeding success. Parameters including water temperature and photoperiod were researched for Phillip Island, Australia to create seasonality in an indoor habitat. This location was referenced, as it is home to the largest colony of penguins in Australia and would allow for a more focused approach instead of taking an average across the blue penguins' range.

The final method to determine if the habitat was the cause for the lack of embryo growth was to implement the use of an incubator. Egg1 of each clutch remained with the parents in the nest box while egg2 was moved to the incubator with controlled parameters. If the eggs in the incubator were more successful than leaving them to be parent incubated, changes to the breeding season protocol could be implemented accordingly.

Improvement Plan

The research collected provided information for improvements and factors that did not appear to affect breeding success. The diet and supplements provided were found to be adequate and comparable to other institutions. The habitat's indoor location provided consistent temperature overall and within the nest boxes. The humidity within the nest boxes, however, varied compared to the ambient humidity and within each individual nest box. To decrease humidity, the size of the nest box was increased to provide the pair more room and allow for more air circulation. Holes were drilled into the sides of the nest box and the lids were raised to provide a gap for additional air flow through the box. A fan was added to the habitat to increase air circulation and evaporation from the sand and nests. The layout of the nest boxes was also changed based on the territorial behaviors observed. In the original configuration the doorways

faced the public viewing window. The penguins inside could see any penguin walking in front of their nest box and would become territorial towards that individual. Territorial behaviors were reduced by rotating the nest boxes, so that the doorways were positioned facing the back of the nest box next to it. This limited the penguins' view of their neighbor's movements.

Photos: Original layout, size and design of nest boxes (left), Current layout, size and design of nest boxes (right)

Research from Phillip Island showed that little blue penguins start breeding season in August and continue into February (winter into spring). At the time, nest boxes at Adventure Aquarium were added to the habitat in October placing breeding season in fall to winter. Starting in the 2019-2020 breeding season, nest boxes were made available in December to match the winter into spring timeline of Phillip Island.

The seasonal environmental parameters researched for Phillip Island were water temperature and photoperiod. Throughout the year water temperatures were found to range from the mid-50s to 70°F; a temperature adjustment schedule was then made for the habitat to increase or decrease the temperature by two to five degrees every two months. The final range became 58-70°F. Phillip Island's shortest day has approximately 9.5 hours of daylight while its longest day has approximately 15 hours of daylight. This led to a monthly lighting schedule change for the habitat, increasing or decreasing the amount of time the lights remain on. The timers for the lights are changed on the 1st of each month, with December having 9.5 hours of light and June having 15 hours of light. Both the water temperature change and the lighting schedule change combined to replicate seasonality in an indoor habitat.

Research on the Phillip Island colony also showed the importance of nest building behavior and composition. This led to increasing the amount of nesting material provided to Adventure Aquarium's colony. Artificial aquarium plants were chosen due to their ease of use for the penguins and their ability to be easily disinfected. Nests grew from an inch or two thick to four to five inches thick. Both males and females were observed collecting nesting material and positioning it within the nest box. Handfuls of nesting material were placed on the habitat multiple times a day for the first few weeks of breeding season, further allowing for natural behaviors of building the nest to occur.

The previously stated changes were all made for the 2019-2020 breeding season, except the parent-incubated and incubator eggs. Use of the incubator was not introduced until the 2020-2021 season (due to Covid-19 related scheduling issues for staff). Over the four breeding seasons with the incubator, seven chicks hatched from parent incubated eggs and six hatched from artificial incubation.

Discussion/Conclusions

With an almost equal hatching success rate between the parents and the incubator, it appears the conditions in the habitat no longer impacted the success rate of hatching chicks. Although the incubator did not boost chick hatching, having eggs in the incubator allowed for additional observations. The eggs incubated by the parents were only candled and weighed once a week so as not to overly disrupt the penguins. The ability to monitor eggs without disrupting parents provided a more in-depth understanding of embryo growth and weight changes during incubation. The earliest an egg could be determined as viable was day five with faint veining and a defined circle observed through candling. Weights were taken weekly showing a 1-2 gram decrease each week throughout development.

Modeling Adventure Aquarium's colony to approximate conditions found on Phillip Island helped establish successful breeding seasons. Providing the nest boxes in December and arranging them for less territorial behavior started the seasons out on the right track. Creating seasonality in an indoor habitat through the adjustment of water temperature and lighting schedules provided environmental cues which have contributed to an increase in breeding success. Increasing nesting material directly impacted the penguins' behavior and led to better drainage in the nest boxes. Adding the fan and increased ventilation in the nest boxes succeeded in reducing humidity. Implementing these changes allowed for a meaningful increase in the success rate of chicks hatching, with a total of fourteen chicks over the past five breeding seasons including the first set of clutch mates, the first successful double clutch and the first fostered chick.

A New Lease on Life: Correcting Hyperextended Rear Fetlocks in a Giraffe Calf

Joseph Nappi, WCS/Bronx Zoo, joseph.nappi@aazk.org

At the end of 2021, a female giraffe calf was born at the Bronx Zoo with severely hyperextended rear fetlocks. Consulting with zoological and equine veterinarians, it was decided to treat the calf through the use of a series of specially designed supportive shoes that would help the calf strengthen her tendons. Mid-way through the treatment the calf also had to be treated for other medical issues including the development of necrotic tissue on the bottoms of both rear hooves, a result of moisture getting trapped within the shoes. During the process of treatment, the calf was hand restrained nine times and anesthetized twenty-eight times to change out shoes and correct this condition. Ultimately the calf's condition was corrected and she was able to successfully walk without the aid of corrective shoes after approximately nine months of treatment. This process was a large collaborative effort between several different departments around the zoo and together we grew as a team to help this giraffe calf be able to walk properly.

A New Lease on Life: Correcting Hyperextended Rear Fetlocks in a Giraffe Calf

Joe Nappi, Senior Keeper, Carter Giraffe Building, Mammal Department
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Abstract:

At the end of 2021, a female giraffe calf was born at the Bronx Zoo's Carter Giraffe Building with severely hyperextended rear fetlocks. Consulting with zoological and equine veterinarians, we decided to treat the calf with the use of a series of specially designed supportive shoes that would help the calf strengthen her tendons. Mid-way through the treatment the calf was also treated for other medical issues including the development of necrotic tissue on the bottoms of both rear hooves, a result of moisture within the shoes. During the process of treatment, the calf was hand restrained nine times and anesthetized twenty-eight times to change out shoes and correct this condition. Ultimately the calf's condition was corrected and she was able to successfully walk without the aid of corrective shoes after approximately nine months of treatment. This process was a large collaborative effort between several departments around the zoo and together we grew as a team to help this giraffe calf be able to walk properly.

On the morning of December 30, 2021, a giraffe calf was born in the Bronx Zoo's Carter Giraffe Building. Initially the calf appeared healthy, but upon closer observation it was discovered that she had been born with severely hyperextended rear fetlocks. The calf was born to dam Zizi, who had given birth previously to two healthy calves without this condition. Other giraffes have successfully been treated for hyperextended fetlocks, however to our knowledge this was one of the most severe cases to be treated. After consulting with several zoos who had previously worked to correct this issue in their giraffe, it was decided that we would proceed and attempt to fix the hyperextended fetlocks with specially designed shoes that would help strengthen the giraffe calf's tendons. We got into contact with Dr. Scott Morrison, an equine vet who oversees the Podiatry Center at the Rood and Riddle Equine Hospitals that have locations in Lexington, Saratoga & Wellington, Kentucky. Dr. Morrison had coincidentally been attending a farrier conference in Washington State when a giraffe calf was born with hyperextended rear fetlocks at the Woodland Park Zoo. He was able to successfully treat giraffe calf "Hasani" through corrective shoes within an approximately two-week period in 2019.

Before Dr. Morrison was able to send us the first pair of corrective shoes, we separated the calf from her mother Zizi. The calf was manually restrained and her hooves and legs below the fetlocks were wrapped with vet wrap and bandages. This was to help prevent any ulceration from occurring as she walked around. We received our first pair of shoes from Dr. Morrison and they were adhered to the calf's rear hooves on January 3, 2022. Unfortunately, the first pair of shoes did not set correctly and both shoes fell off the same day. The calf was restrained again the

following day and the shoes were attached to the rear hooves and wrapped with elastikon and vet wrap to help better adhere and stabilize the shoes. We utilized a number of different glues throughout this case study, but found that Equilox II ® (Manufactured by Equilox 110 NE 2nd Street Pine Island, MN 55963, Phone: 1-800-551-4394, Website: equilox.com) worked the best. The containers of Equilox had to be freshly opened the day of each procedure to ensure they were at their peak performance, otherwise we found the glue would sometimes not adhere as well.

Measurements were taken during each immobilization to keep track of hoof growth which Dr. Morison used to help him determine the calf's estimated hoof size for the next pair of new shoes. We also measured the calf's range of motion to track the progress of her tendons strengthening and tightening. The calf's legs would be placed on a large sheet of paper and then traced. The hooves would be pushed forward and backward to determine the range of motion and then measured with a protractor to determine the number of degrees the hooves were able to be manipulated forward and back. It was helpful to see her progress as the degree of flexion decreased over time.

Our vet staff felt that it was very risky to anesthetize such a young calf and we opted to manually restrain her for as many of the early procedures as we could. The giraffe calf was manually restrained nine times for the initial shoe changes. Initially once the calf was restrained, she would lay down and stay relatively still. As the calf reached about a month in age, she became much stronger and began fighting the restraint process. At this point we determined it was no longer safe for staff to attempt to restrain the calf, and we began anesthetizing the calf for each procedure.

For the first month and a half, the calf and her dam Zizi were kept on stall rest in their maternity stalls. In order for the calf to strengthen her tendons, she needed to walk around as much as possible. On February 16, 2022, the one and half month old calf was given access to the indoor exhibit for the first time. This larger space encouraged the calf to walk much more and continue to strengthen her tendons. An off exhibit yard was the next space the calf was introduced to. Out of concern that the shoes could be an issue on an uneven surface, the yard was regraded to help prevent any tripping hazards

During a normal shoe change on March 7, 2022 it was discovered that the tissue on the bottoms of both rear hooves had become necrotic and was sloughing off. It is believed that moisture got trapped in the shoes and mixed with the adhesive which caused the hoof material to become necrotic. This was a very demoralizing situation. The veterinary team did not initially have high hopes of being able to fix this condition, especially given that her pedal bones were exposed. Pictures were sent to Dr. Morrison and he thought that since she was so young, her hooves could be saved. We removed all the necrotic tissue as well as the tips of both P3 bones. The hooves were bandaged and placed in a new set of shoes. Dr. Morrison then designed a new set of shoes that had a removable plate on the bottom that would allow us to access and clean the bottom of her hooves without having to go through the labor-intensive process of removing and re-gluing

the shoes on her hooves each time.

The giraffe calf continued to be immobilized on a weekly basis. Miraculously, the soles of both rear hooves fully re-grew healthy tissue over an approximately three-month period. The range of motion of her back hooves continued to diminish. Her right shoe was permanently removed at the beginning of April 2022 after about three months in the corrective shoes. At the time the shoe was removed, there was still a good amount of flexibility in the tendons, but she continued to strengthen her tendons over time. The left rear foot continued to require a shoe until September 2022, at which point her left rear foot was strong enough to support her weight without a shoe. It took approximately nine months for the final shoe to be removed.

The calf was eventually named "Tayari", which is a Swahili adverb meaning 'ready to…' because we believed she would be ready to do anything after her medical ordeal. In total we hand restrained Tayari nine times during the first month of her life and anesthetized her twenty-eight times within a nine-month period before her last shoe was removed. Zoo staff was elated to celebrate Tayari's one-year birthday at the end of December 2022. Tayari was immobilized again in August of 2023, approximately one year after her last shoe was removed in order to trim her back hooves which grow at a much faster rate compared to her front hooves. The rear hooves also grow abnormally, especially the right rear foot which has continuing joint problems, causing Tayari to put more weight on her lateral digit. Currently the giraffe care team is in the process of training Tayari for hoof trims. Despite her rough start in life and many immobilizations, she is remarkably resilient and loves to take part in training sets. She currently will allow us to work on her front hooves. The Bronx Zoo replaced an old restraint with a new TAMER Giraffe Restraint from Fauna Research, Inc at the beginning of 2024. This tamer will allow for more opportunities to work with Tayari on training her for back hoof trims. Tayari's rear hooves were trimmed again during an immobilization in July 2024 with Steve Foxworth of the Zoo Hoofstock Trim Program.

It certainly was a huge collaborative effort between multiple teams of people to treat Tayari's hyperextended rear fetlocks. Special thanks go out to WCS veterinary staff, especially Dr. John Sykes and Dr. Paul Calle, assisting veterinary technicians, Mammal Department staff including Curator of Mammals Colleen McCann, Curator of Ungulates and Carnivores Donna Doherty, Mammal Collections Manager Bryan Robidas, Mammal Supervisor Brandon Moore, and Carter Giraffe Building keeper staff. An especially important thank you to Dr. Scott Morrison for helping us to maintain hope in correcting this problem, designing all the pairs of specialty custom made shoes and guiding us through the process of correcting this condition.

Voluntary Blood Pressure Training in Omaha's Henry Doorly Zoo and Aquarium's Lemur Population

Megan Buecher, Omaha's Henry Doorly Zoo and Aquarium, megan.buecher@omahazoo.com

Omaha's Henry Doorly Zoo and Aquarium is home to 35 individual lemurs encompassing 8 species. Cardiovascular and renal disease are common in not only our population but other lemurs in human care. In the fall of 2023, 0.1 mongoose lemur "Selena" suffered an ischemic stroke. After many tests it was determined that she had hypertension or high blood pressure, and she was started on a blood pressure medication. The need for blood pressure monitoring became apparent to determine her overall health and treatment monitoring. Blood pressure is the measurement of the pressure of blood inside the body's arteries. In the scientific literature there isn't much information directly related to normal blood pressure assessment or blood pressure monitoring in lemurs. Blood pressure monitoring can be helpful for long-term management and for treatment monitoring of many diseases, especially when evaluating the cardiovascular system. While obtaining blood pressure readings on lemurs during an anesthetic event is common, voluntary readings from an awake lemur are more difficult to obtain. Using operant conditioning training methods, and working with veterinary staff, the Expedition Madagascar team have started training voluntary blood pressure and have successfully collected readings from several individuals. This ongoing training has presented challenges and success among the different lemur species staff care for. With mongoose lemur "Selena" being the catalyst, our ultimate goal is to collect readings from all of our different lemur species. Working as a team along with veterinarian staff we hope to achieve this lofty goal.

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Abstract

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Introduction

Omaha’s Henry Doorly Zoo and Aquarium’s Expedition Madagascar building houses one of the largest collections of Malagasy animals outside of Madagascar. The crew of 7 fulltime keepers, including the supervisor, and 1 seasonal/summer keeper works together to care for the mammals, reptiles, birds, fish, and amphibians that call Expedition Madagascar home. The largest taxa the crew cares for are the lemurs. The building is home to 9 different species of lemur with 38 individual animals.

There are over 120 species of lemurs in the world, all endemic to the island of Madagascar. There are several genus in the lemur family. For this paper we are going to talk about two of them, the ***Eulemur,*** sometimes referred to as the true lemurs, and the ***Varecia*** or ruffed lemurs. At Omaha we have 4 species of Eulemur: crowned lemur, blue-eyed black lemur,

mongoose lemurs, and collared brown lemur. And both species of Varecia: Black-and-white ruffed lemur and red ruffed lemur.

In the Madagascar building animal training is individualized. Every individual animal has a primary trainer. Each keeper on the crew has several animals, across the taxa, that they are primary trainers of. They shape new behaviors and clean up established behaviors if needed. All keepers in the area train all individual animals in maintenance behaviors. With so many animals and so many groups of lemurs it is impossible to train every individual every day, but the crew has a set time every afternoon dedicated to training. For most of our lemurs, across species, raisins are the primary reinforcer, however, fruit and diluted honey are also used.

The Stimulus

One morning, in the fall of 2022, 0.1 mongoose lemur "Selena" presented with neurological conditions. She was off balance, unable to use her right hand and foot, had anisocoria, seemed to have trouble finding food that was right in front of her, was drooling, and had clear mucus from her nose. Selena was taken to the veterinarian hospital where she was given a full work up. Blood was taken and sent out for testing, ultrasound and radiographs were taken and her blood pressure was taken. She seemed to stabilize for about a week when she had another episode. She was again examined by veterinary staff. More blood was taken as well as more blood pressure readings. Initial blood pressure was high at the first immobilization but did come down at the second. After consulting with a neurologist and seeing her blood work results which came back with no clotting or other issues, it was determined that she suffered from an ischemic stroke where hypertension was a causing factor. Essentially, Selena had high blood pressure. Blood pressure is the measurement of the pressure of blood inside the body's arteries. She was started on a daily low blood pressure medication, Enalapril. In the scientific literature, there isn't much information directly related to normal blood pressure assessment or blood pressure monitoring in lemurs. Blood pressure monitoring can be helpful for long-term management and for treatment monitoring of many diseases, especially when evaluating the cardiovascular system. The need for blood pressure monitoring became apparent to determine Selena's overall health and treatment. Taking a blood pressure on a lemur is done just like it is in humans except instead of having the cuff on the arm, it can also be recorded by placing a cuff on the lemur's tail. Air is pumped into the cuff to tighten it then it is slowly released. When measured you get two numbers, systolic and diastolic. Systolic blood pressure (the first and higher number) measures pressure inside the arteries when the heart beats. Diastolic blood pressure (the second and lower number) measures the pressure inside the artery when the heart rests between beats. Being as still as possible during the reading will yield the most accurate results. When under anesthesia, the animal may be still but there can be large swings in blood pressure and often blood pressure readings will be decreased from what is normal.

After being on Enalapril for about a month, vet staff wanted to re-check Selena's blood pressure readings. Not wanting to immobilize her again the only way to get a mostly accurate

blood pressure reading was to hand restrain and get the readings. Obviously, hand restraining an animal is stressful and potentially unsafe for both the animal and the zookeeper, not to mention the stress of the restraint would cause the blood pressure reading to be higher and therefore not as accurate. Since monitoring Selena's blood pressure was something that we would need to do regularly, we, as a team, determined that voluntary blood pressure readings were something that we needed to train.

While Selena was the catalyst for starting this behavior with our lemurs, our goal became to get voluntary readings on them all. Having information about the normal levels on awake lemurs from several species would not only help our animals and veterinary staff but could be useful for the entire zoological community.

Getting a lemur to allow a cuff to be placed on their tail and then have it tighten around the tail all while sitting still was a challenge, especially for the Eulemurs. If you have worked with ruffed lemurs, they are typically social and friendly with their keepers. Many tend to enjoy tactile stimulation or grooming from keepers. Our ruffs are no exception, especially our red ruffed lemurs. Many of our individuals enjoy being scratched and scratches are sometimes used as a reinforcer for some of our individuals. If you have ever worked with Eulemurs, you know they are mostly the opposite. They tend to be flightier and don't typically enjoy tactile stimulation from keepers. Getting our Eulemurs, which includes mongoose lemur Selena, comfortable with touch has been a challenge.

Where to start?

The first step in training a new behavior is to write a shaping or training plan. I'm going to touch on the methods we used to on several different species, and how they are different depending on the species. When writing the approximations, I realized the behavior needed to be broken down into smaller behaviors. I needed to first start by training a touch behavior, then a tail behavior, then we could move on to the blood pressure behavior. Let's start with the easy lemurs to train. As mentioned above, our ruff lemurs enjoy tactile interactions with their keepers. Many of our ruff lemurs were already comfortable and are reinforced by scratches. Many of them have already established behaviors that involve the keeper touching them in various places such as the hip or stomach. For them, it was an easy transition to allowing us to touch or hold their tail. The next step after that was duration. Since the blood pressure reading takes about 30 seconds, we needed the lemurs to allow us to hold their tail for at least that long without them pulling away or moving around. Once they were comfortable with that, we added the stimulated constriction. The lemurs need to allow keepers to hold their tail and squeeze it. Once that was established, we added the practice cuff and a second person. We were asking the lemurs to be comfortable with another person putting the cuff on their tail while the primary trainer focused on the reinforcement. For all the red ruff lemurs we tried this behavior with, it only took one or two sessions before they were comfortable with the above. As mentioned above, raisins were used as

a reinforcer but for a few individuals, tactile interaction was also used as a reinforcer. Once the ruffs were comfortable with keepers touching, holding, and squeezing their tails all while holding relatively still, we brought in the vet tech and tried the real blood pressure cuff and got readings. So far, we have successfully gotten several readings on 6 individuals!

While training a voluntary blood pressure behavior on ruffed lemurs was relatively easy, training the behavior with Eulemurs has proven to be more difficult. As mentioned before, Eulemurs tend to be more skittish and not as comfortable with keepers touching them. When writing the training plans for them, we had to break the behavior down a lot more and work more step by step. For example, when writing the plan for 1.0 blue-eyed black lemur "Hiddleston" I had to first start with getting him comfortable with me touching him on the hip and tail. I continued working on just a quick touch until he was comfortable enough to where he wouldn't run away every time I touched him. He would stay near me and engage in the session. Next, I moved to grab his tail and then let it go. I started by feeding him raisins and touching his tail at the same time, then I worked on grabbing his tail , then bridging and rewarding him after I grabbed it. We slowly worked up to him allowing me to grab his tail, move it around , then bridging and rewarding. This has been a slow process, and I must get him in the right position to allow tail access. Currently, with Hiddleston, we have progressed to him allowing the vet tech to place the cuff but are still working on duration to get the actual reading.

Challenges

Throughout the process of training this behavior with our lemurs, we have had several challenges. First and foremost, has been a lack of time. This is a challenge for a lot of zookeepers. For our crew, there have been a lot of changes in staff over the last two years. Crew members left to go to other departments for promotions and/or to work with other taxa of interest. We haven't had a consistent full staff for a little while. There are also a lot of animals that our crew cares for. In addition to our 38 individual lemurs, we care for various other mammals, birds, fish, and herps, all of which need attention and training. Our collection of lemurs is also mostly geriatric and medical issues have come up frequently in the last two years. Training focus has also been shifted in the area. We have several breeding pairs in our collection and the need for the females to be ultrasound trained to monitor pregnancies became a priority for our keepers. Omaha Zoo recently teamed with Behavior Works and our department decided our priority for training with their consultants became working on large lemur groups where the number of lemurs is higher than the number of keepers. In addition to department animal training goals shifting, getting ready for AZA accreditation took a lot of free time away from training goals and moved them to accreditation preparation. Because we have been unable to be consistent with training this behavior, it has taken longer than expected to establish the behavior with many of our individuals. It is still a work in progress. While we have had many successes, we still have a long way to go and our goal of getting all the lemurs blood pressure trained is still

a way away. With Selena, we have made great progress but are still working on her being comfortable with the second person touching her tail. But every week, we make progress and seeing results and progress, no matter how small, is very rewarding.

Further questions

As we go along with this process there are further questions to consider. Does the position of the lemur matter? For example, if they are hanging while the blood pressure is taken, will there be a significant difference in the blood pressure numbers vs. if they are on all fours? How big of a difference is there in readings between same species? As we continue to hone the voluntary blood pressure behavior, these are things to keep in mind and work with veterinary staff to standardize results.

Conclusion

Blood pressure readings in lemurs needs more research to establish a normal healthy range. Obtaining voluntary readings from lemurs under human care can be helpful for long-term management and for treatment monitoring of many diseases. While we have information about an anesthetized lemur's blood pressure, our goal in the Madagascar building was to obtain awake readings to show what their normal blood pressure would be. Although, we have yet to get a reading on mongoose lemur, Selena, the reason we started this training, we have been able to get successful readings on 6 individuals so far. Training this behavior is ongoing. We will continue to work through challenges and refine criteria to get the best, most helpful results for our veterinary team.

AAZK's International Outreach Committee: Providing Opportunities to Latin American Colleagues

Yvette Kemp, yvette.kemp@aazk.org

The American Association of Zoo Keepers's (AAZK) International Outreach Committee (IOC) was established in 2016 to provide training, resources, and opportunities for Latin American animal care professionals to better provide for the animals under their care. Since its inception, the IOC has been able fulfill its goal of increasing resources and training for our colleagues through capacity building programs, translated materials, a Latin American Travel Grant, reduced membership costs, and an AAZK member sponsorship program. The IOC has also been able to work and partner with Latin American Zoo and Keeper Associations to provide a bigger effect in the animal care field. During this presentation, AAZK Conference attendees will learn details about the IOC, its programs, the impacts it has had in the Latin American animal care community, and how AAZK members and chapters can become involved in its programs.

AAZK's International Outreach Committee
Providing Opportunities to Latin American Colleagues

Yvette Kemp, Chair
International Outreach Committee
American Association of Zoo Keepers
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Introduction

Since the American Association of Zoo Keepers (AAZK) began in 1967, its mission has been to provide professional opportunities to those in the animal care community. Fifty-seven years later, it continues to do so through its various committees and programs, involvement in communities, publications, and one of its biggest resources, its members.

With this in mind, the International Outreach Committee (IOC) was formed in 2016 to assist international colleagues in Latin American countries. Its main purpose is to offer resources that support advances in the animal care field through professional development and educational resources. Unlike in the U.S., there is no zoo keeping career per se. Those that do work in zoos or aquariums as animal care givers, have had to get into it in a round-about way. Most have either studied biology, gone through pre-veterinary school, or have learned their skills on the job, with on-the-job training being the most common type of training. This "profession" also lacks the respect of a career, so at many facilities, keepers are also jacks-of-all-trades who assist with non-animal related projects. The IOC wanted to be able to offer the tools needed to those who are dedicated to animals under human care so that they could not only provide the best care but be a part of a network of animal care professionals who share husbandry information and concepts.

The IOC is truly a very busy committee. We have 15 members, with a third of them having been on the committee since it started, and half have been on the committee for at least 4 years. My goal today is to share the various projects AAZK's IOC is involved in and try to get you more involved with our committee.

Capacity Building Programs (CBP)

The IOC's signature project is our Capacity Building Programs (CBP). CBP's are basically mini conferences. Every year, the IOC organizes at least one CBP at an institution in Latin America (LA), so far mainly in Mexico. These programs are opportunities for LA keepers to participate in workshops, learn from their colleagues from different facilities, share information, and meet other like-minded professionals. Members from the IOC and other institutions from the U.S. usually join us as presenters to share their knowledge on specific subject matters and we invite LA keepers to do so as well. It's unusual for there to be a platform that focuses on professional development for keepers in Latin America, as most conferences are mainly for zoo directors and veterinarians. But since AAZK held its first CBP in Mexico in 2017, keepers look forward to participating in such programs. We also have an agreement with the "AZA of Mexico" AZCARM (Asociación de Zoológicos, Criaderos, y Acuarios de México) to provide a CBP at their annual conferences and support their developing keeper association. Besides the annual AZCARM conference, we have provided CBPs at various institutions for either just their personnel or for animal care professionals in the area. All in all, the IOC has hosted 12 CBPs with 60 to 120 participants at each program. That is a reach of over 1,000 animal care professionals that have joined us for these programs. I must admit, the experience is amazing! The enthusiasm of the attendees, the awareness that by sharing information you are helping a colleague, and that you are a part of someone's professional growth is a great feeling! And don't even get me started on the friendships that are made. But I would have to say that the best part is seeing how the LA animal care community has changed throughout the years. Our goal has also been to encourage professionalism in the animal care field and share how people in our field not only can have an impact on how animal care is provided at work and at a conservation level, but also how the perception of what we do can be altered in a positive way. Seeing that mind change in our LA colleagues has been amazing.

The CBPs have been so successful that in 2022, AAZK started offering scholarships that cover the registration costs for 2 attendees every year. As in many places around the world, attendees of our CBP mini conferences usually cover their own expenses and take personal time to attend. Providing the scholarship helps alleviate the monetary impact they may endure, especially since salaries for animal care professionals throughout LA are very low. The CBP registration cost is approximately $75.00 and includes all the conference activities and several meals. AZCARM has also joined us in providing generous scholarships that cover registration and hotel stay for up to 4 attendees. Between both organizations, we have been able to make sure more animal care professionals are able to attend these learning events.

Besides the CBP, IOC also offers zoom presentations that cover topics aimed at providing more resources for animal care. As you can imagine, the idea began during the pandemic when we were all unable to get together. We have hosted 29 zoom presentations since they began in 2020,

with topics ranging from safety and training to conservation and zoo projects and we are always looking for presenters willing to share their experiences.

Latin American Travel Grant (LATG)

Another exciting IOC project, which is a collaboration with the Grants committee, is the Latin American Travel Grant (LATG), an AAZK grant designed specifically for Latin American animal care personnel to attend an AAZK annual conference. This $3,000.00 U.S. dollar grant helps the recipient cover expenses such as registration, hotel, and airfare incurred while attending the conference. Due to very low keeper wages, high exchange rates, and expensive travel costs, attending a conference, especially in another country, is not a realistic option. If it wasn't for this grant, most LA personnel would not be able to afford it, thus missing out on an incredible opportunity to experience the comradery within the animal care community and see how keepers from many facilities come together to share information.

The first LATG was awarded in 2018 and since then, we have had 6 recipients from LA attend an AAZK conference, with 2 keepers from Mexico sharing the award in 2019. In 2021, when lingering pandemic restrictions forced the AAZK Conference hosted by the Los Angeles Chapter to be held in a hybrid format, AAZK was able to award 15 Latin American keepers the opportunity to attend the virtual portions of the conference! This made it possible for attendees from Mexico, Argentina, Chile, Colombia, and Guatemala to take part in a very international AAZK Conference.

This year, we are excited to have our 2024 recipient Emiliano Scolese from Argentina's Ecoparque of Buenos Aires joining us here in Omaha.

Latin America Emerging Nations (EN) Membership and Sponsorship

In 2018, the AAZK Board and the IOC worked together to try to make AAZK membership more accessible to our LA colleagues. Knowing that we wanted to be able to provide them with information from our AAZK resources, but that cost was an issue, AAZK's Board graciously agreed upon a more accessible solution. What emerged was the LA Emerging Nations Membership and Sponsor program. Recognizing that LA animal care professionals' salary does not allow for a lot of added expenses, the cost for an annual membership for those residing in a LA country was reduced from its current cost of $65.00 US dollars to $15.00 US dollars per year, a price that is much more affordable to the LA zoological community. Not only was the membership cost reduced, but a program was developed to provide free annual memberships sponsored by AAZK chapters and members. The LA EN Member Sponsorship pilot was presented that year with only 10 sponsored members selected from our LATG and CBP programs. This year, I am thrilled to share that we had 202 sponsored memberships thanks to over 40 different AAZK members and chapters who donated membership packages! This year's EN sponsored members come from Argentina, Belize, Bolivia, Chile, Colombia, Ecuador, Guatemala, Mexico, and Venezuela and are so excited and grateful to the AAZK community. There will be an article coming out in the AKF so that you can meet some of our LA colleagues.

Translations

Speaking of the AKF, another one of the IOC's projects involves translating. As you might imagine, many of the EN members do not speak English, so the IOC wants to ensure that they feel included in the AAZK community. The IOC's Translation Team not only has been translating available AAZK resources, but also social media posts and communications, conference materials, and select articles from the monthly AKF to share with our EN members.

The IOC has developed a resource library that helps us store all the information we have accumulated throughout the years and as our LA member numbers increase; we want to make sure that they have many of the same resources available as our English-speaking members. Knowing that it would be very hard for us to translate every single item, we survey our members to learn what their main interests are and what information should be prioritized.

How to Get Involved

If any of this sounds like something that you would be interested in doing, just let us know. Contact anyone at AAZK or the IOC (ioc@aazk.org) and we'll gladly figure out how best to get you involved. Often AAZK members think that Spanish is required to be a part of the IOC and that is not the case. Half of the IOC team does not speak Spanish and they participate in all aspects of the committee.

Here are a few ways to become involved with the IOC:

- Share your experiences through Zoom presentations,
- Join us at a CBP sharing your expertise through a presentation or workshop,
- Sponsor a LA colleague's membership (the Emerging Nations sponsorship drive is held at the beginning of each year),
- Share your LA contacts so we can invite them to learn more about AAZK,
- Host a LA keeper at your facility,
- Visit LA facilities (we can try to put you in contact with someone wherever in LA you may be visiting),
- Share your ideas on ways we can involve our LA members.

Contact us and we can see where it takes us.

Conclusion

AAZK's IOC has successfully been able to become a part of the LA zoo community by providing capacity building programs, grants, affordable memberships, translated resources, partnerships, and more. But more than that, we have been able to make friends all over the world and work with colleagues who are just as passionate as we are about animal care and conservation. The only reason why we have been able to succeed is due to the AAZK community and its willingness to become involved. Everything we have been able to do is because AAZK chapters and members have shared resources either in the form of knowledge or funding and this has been passed along to the LA community who are always amazed at the association's members generosity. So, on behalf of AAZK, the IOC team, and the LA animal care community, Thank You! And don't forget to write!

Why KEEP?

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During my presentation “Why KEEP?”, I aim to discuss both the logistics and the benefits of the Keeper Educational Exchange Programme (aka KEEP) for both collections and zookeepers. As the Director, I’ll explain how we have gotten the programme running in the UK, what the hurdles were in its first year of operation, how we’ve gone from strength to strength and what our plans for the future are. With the conference theme of “Together we Grow”, I feel it’s an excellent time to deliver a presentation based around the advantages of sharing knowledge, developing skills, and building networks using the exchange programme, and how we feel it could benefit American keepers. We are only as strong as our weakest link, and this presentation aims to inspire those looking to gain new ideas and contribute to better animal welfare by opening up a new approach to continuing professional development. It would be a pleasure to discuss how this operation has worked for the UK, and I truly hope you’ll consider my application.

“Why KEEP?”

By the Keeper Educational Exchange Programme (KEEP)

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Introduction

The Keeper educational exchange programme (KEEP) is a small NGO, founded in 2020, which aims to connect zookeepers and zoological collections. KEEP is run by a team of 4 zookeepers on an unpaid basis, where they strive to use their experiences and passion to help further the mission of KEEP and ultimately benefit the continual professional development of keepers and welfare of zoo animals. The mission statement of KEEP is as follows: “To facilitate keeper professional development, promote communication between collections and to foster a sense of transparency in zoos, in order to improve animal welfare and achieve conservation goals”.

The primary goal of KEEP is simple: to provide a platform for zoos to advertise practical placements that will help keepers from other collections develop their knowledge and understanding of animal husbandry and in turn optimising collective welfare standards. KEEP aims to support both zoo and keepers to make sure that the placements/exchanges run smoothly and are as beneficial as possible to all involved.

A need for KEEP?

Zoo keeping is cited as many things; “dream job”, “a passion”, “a purpose” and for professionals working in caring roles with non-human animals this is rightly true as the work they do can be considered “purposeful”, “rewarding” and “meaningful” (Brando *et al* 2023). Whilst these roles have their highs and can be very rewarding, they can come with serious occupational stressors such as dissatisfaction with managers and facilities, sadness related to animal loss/welfare issues, work/life balance and co-worker conflict (Brando *et al* 2023).

High staff turnover has been increasingly frequent in zoo-keeping collections, with compassion fatigue related issues often cited as a major cause. This is entwined with staff management issues, whether the cause of/caused by compassion fatigue (Bemister-Bourret & Tawfik 2023).
There have been several high-profile cases involving zoo staff dissatisfaction and high turnover/animal welfare complaints both in the UK and abroad (BBC 2024, NZ Herald 2024). With numerous highly experienced staff leaving such collections, resulting in a significant loss of knowledge resulting in difficulty replacing this and often inexperienced staff promoted internally which can lead to further problems.

Good animal-keeper relationships have been shown to important to the welfare of animals in human care, but with higher levels of staff turnover it can be hard for the relationships to be maintained or formed at all (Birke *et al* 2019). Ultimately animals benefit from keepers who stay in their jobs – therefore how do we keep keepers keeping?

Zookeepers have been shown to value motivation, enthusiasm and formal training as key to morale and continuity in the role, yet it has been shown that they haven't always felt supported in formal training opportunities. Staff salaries can be a difficult resolution, yet there are steps that can be taken to foster motivation, enthusiasm as well as facilitating learning and training (Bacon *et al* 2023).

Formal training can take many forms but one of the most positive and potentially accessible is through keeper exchanges. By spending time in another zoo collection, there is an increased opportunity for idea exchange, discussion, networking, learning and enthusiasm. Keeper exchanges are not a new idea and have been done infrequently between zoos.

These have often been long exchanges – some months at a time and between countries which can lead to complexities such as accommodation, salary, working role etc. as well as being expensive and complicated to set up. Keeper exchanges can be quick and accessible forms of staff training and CPD, however these have often been infrequent and dependent on the contacts of the collection.

Whilst a keeper exchange is not a quick fix to problems, KEEP believes that this can be part of the solution. Keeper exchanges are a form of staff training or CPD and due to the costs associated with training and sending the employee on an exchange, this can be seen as an investment in that zookeeper. It is this investment in the keepers training and development that has been shown to be instrumental in staff retention across numerous job sectors (Rodriguez-Sanchez *et al* 2020). The costs associated with a KEEP placement are just the travel e.g. fuel/train and the accommodation. This is a cheaper former of CPD than sending staff on a conference for instance, due to the cost of attending the conference/workshop, yet on a keeper exchange this is highly applied practical learning.

KEEP has, as of the end of July 2024, approved over 230 keepers and 50 animal institutions registered, resulting in over 50 keeping exchanges since launching in January 2023. The primary focus of the placement is the experience of the keeper visiting the hosting zoo. From what we have found is that many more staff benefit indirectly. The hosting keepers can demonstrate their high levels of animal care whilst gaining ideas/knowledge from the visiting keeper which then, in turn, can benefit animals at both collections. In addition, colleagues of the visiting keeper can benefit from the knowledge/experience gained at the new collection and use this to ultimately benefit the animals in their care.

KEEP is currently only working with zoological collections within the United Kingdom and Ireland, with the success and opportunities advertised has increased demand from zoos in other countries. Initially this was quite early on into our launch and whilst attempting to master how to remotely coordinate frequent exchanges across the UK, we realised that expanding our horizons too early on could cause more problems than it would solve. As we rapidly approach two years of operation and having got more established and efficient at delivering our mission, those calls for expansion have become harder and harder to ignore.

Increased backing from corporate sponsors and official partnerships with BIAZA and Hose2Habitat have given us a greater platform within the UK and Ireland but with a greater access to key contacts we have been able to start casting the net wider and wider. As of the time of writing KEEP has two international zoos signed up; Ugandan Wildlife Education Centre (UWEC) and the Bali Bird Park. We hope that these are the first of many and with an increase in very generous sponsors and donors, the feasibility of doing regular placements for collections like this becoming increasingly possible. In July 2024, Chester Zoo hosted the first KEEP applicant from outside the traditional base of the UK when Arianna from Bioparco di Roma took part in a weeklong exchange with the primate team.

The successful exchange with Bioparco di Roma (who funded the trip for Arianna) has given KEEP a real push to reach out to colleagues in different countries. Following conversations with keepers in the USA and members of AAZK is why KEEP has been welcomed to this year's conference, particularly as the theme is "Together, We Grow". Having discussed the programme with others, we have learned there have already been/and still are some exchanges within zoos in the US. However, what KEEP intends to do is to make these opportunities more frequent, more accessible and ultimately connect zookeepers together for the benefit of the animals in our care.

Whilst KEEP is currently UK-centric, the intention is not to solely have UK keepers visiting everywhere else. Our aims are to run domestic placements within other countries (US-US for example) and international placements between different branches of KEEP (US-UK or France to Germany for example). We feel that the more connected we are and the better the flow of knowledge and expertise, the better we are as a collective and ultimately this means larger strides towards better animal welfare and conservation.

What we aim to achieve through our attendance at this year's conference is to inspire, raise awareness and speak to as many people as possible to gauge interest and look at running possible trial placement opportunities, with the goal of establishing a branch of KEEP within North America. Within the UK, the feedback from keepers has been universally positive, receiving 100% positive feedback from the Feedback forms we provide post-placement. Keepers who have been selected for placements have fed back to us how they have been able to share what they've learnt with their colleagues, which ultimately widens the impact of their time at another zoo/aquarium. As demonstrated by Bacon *et al* (2023) – happy keepers equal happy animals and this is the KEEP mission stripped back to its simplest form. We are hoping this sentiment is something that we share with AAZK keepers.

Conclusion

As we look to the future, KEEP has a number of ambitious plans lined up, including KEEP branches on other continents, a programme for Zoo Educators, and a conservation-focused department of KEEP called "KEEP Conservation", which aims to give opportunities to experienced and staff with particular expertise to visit and share with *in-situ* projects for an applied conservation impact and capacity sharing. Through our presence at the AAZK conference this year, we hope to gain support and enthusiasm for the programme from our

friends and colleagues in the United States and look forward to discussing common goals in person in September.

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The Development and Implementation of a Training Course for High School Students

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The Zoo School program at the Columbus Zoo is a program in which high school students spend half their day at the Columbus Zoo taking classes. During their second year of the program the students have a section on animal training. The keeper led training committee at the Columbus Zoo was approached to develop and implement a plan to aid in teaching the students about training. The training committee developed a program that involves four parts: a reading section, a presentation section, table top exercises, and training observations. The goal was to engage the students while increasing their knowledge of training. The first part of the program was led by the zoo school instructor. The second part was led by a member of the training committee. Both these parts were designed to give the students a basic understanding of training principles. The third part, the table top exercises, were designed by keepers around the zoo to give a more real life example of training and allowed the students to work through the entire process of training. The last part, the observation of training, was designed to show how different trainers train and to expose the students to different species. With this approach we are hoping to give students a strong foundation in training animals. With the success seen there is plans to expand the program to interns and new keepers.

The Design and Implementation of a Training Class for High School Students

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Abstract

The Zoo School program at the Columbus Zoo and Aquarium is a program where local high school juniors and seniors come to the zoo to take classes. One of these classes in the senior year focuses on the principles of training. In the past this portion of the coursework had the students training goats in the children's zoo barn, however this portion needed to revamped and the teacher for the curriculum came to the zoo's training committee for ideas. The training committee came up with a plan to introduce the students to training principles. The final program includes class lessons by the teacher on Karen Pryor's Don't Shoot the Dog, introduction to training by a training committee member, tabletop exercises put together by trainers around the zoo, and training demonstrations with keepers around the zoo with various animals. The goal was to introduce training to the high school students while making it fun and to show different techniques of training in action. This program has been considered a success for the two years that it has been implemented. Moving forward, the plan is to expand the program to interns and seasonal employees around the zoo.

Background

In its nearly 100-year history, the Columbus Zoo and Aquarium has grown from a small city zoo into one of the largest zoos in the country. This growth has led to robust animal care and education departments within the zoo. These two departments have created many different programs through the years and have collaborated a lot on those programs.

One of the more unique programs that the Columbus Zoo has is the Zoo School. This highly competitive program is open to junior and senior high school students throughout central Ohio and allows them to take classes at the zoo for half a day. First year students focus on the foundation required for a scientific career including classes in research methodology, statistics, and zoology. The second year has advanced classes and also an internship opportunity in one of the animal departments.

At the Columbus Zoo there has been a push for keeper led committees to focus efforts around the zoo on topics from animal well-being, animal enrichment, and species focused husbandry. Another one of these committees is the animal training committee which consists of keeper representatives from across the zoo and was started in 2016. This group was formed to allow for more consistency in training across the zoo and allow for greater collaboration between the staff of different areas. This committee is responsible for organizing open houses in departments for other keepers to see training, developing a training newsletter for staff, and working with keepers when behaviors are not progressing.

Zoo School has worked with animal care in various ways in the past including helping with the topic of animal training that is taught during the second year. In the past this was a topic that was taught by the zoo school instructor and the students had the opportunity to practice the techniques with the goat herd at the children's zoo. While this was a great opportunity it was a large time commitment from the keeper staff involved and was not able to be continued. It was then brought to the training committee to see if a new program could be developed.

Program Development

When presented with this task the training committee knew that the program needed to be spread throughout the departments. It was clear that while the training the goats was a phenomenal opportunity for the students, it would not be possible for the students to do this with animals across the zoo due to the dangerous nature of some of the animals in the departments.

The training committee then focused on what would be needed to build the students into entry level trainers without actually training an animal in real life. They came up with a 4 part program taught in 2 different sections that would allow them to get a baseline of training knowledge and then working on application of that knowledge.

The first section of the course consisted of the zoo school instructor going over different chapters of the book Don't Shoot the Dog by Karen Pryor. Concurrently with this instruction, a member of the training committee goes through a 6-part Training 101 that covers everything from terminology to regression and problem behaviors. The goal of this is to give a strong foundation of training knowledge in two different forms and styles so that they are ready for the second half of the course focusing on application.

The second section has both in classroom exercises and field trips to different areas of the zoo. The classroom exercises consist of a tabletop exercise every week. These table top exercises are led by different keepers from around the zoo working with different species. The goal is to not only introduce the students to how training is universal in some aspects, but in other aspects species specific. The tabletop exercises start with training a basic behavior to an animal. Students are required to work together as a small group to develop a training plan, explain the plan to the class, and then problem solve when an unforeseen hiccup happens during the training process. During the course the tabletop exercises get more complex and introduce different problems that the trainers running the exercise have faced during their careers training animals. Some of these problems include regression, training groups of animals, short staffing,

government permitting, and animal aggression. This allows the students to work on their ability to pivot when original plans do not work.

In between tabletop exercises the students are divided into groups and take field trips around the zoo to see training demonstrations. The goal of this is to show the students that different trainers have different styles of training and that training can be done in different ways. It also gives them the ability to see the training principles they have been learning about in action and sometimes see how trainers react when training doesn't go as planned. Students typically see training presentations with birds, large carnivores, hoofstock, marine mammals, and primates giving them an idea of how training is done with different taxa.

Implementation and Challenges

The implementation of the first section of the program went quite smooth. This was partially due to the fact that both of these portions of the course had already been developed and taught, although not together to the same audience. The second part of the course went well, although there were a couple of challenges that had to be dealt with. The first challenge that was encountered was that the tabletop exercises were a new development for the training committee and as such they needed to be written by the keepers. The time commitment that this took was not something that was not expected as they took longer than was originally anticipated to write. Also, as with any animal care position, emergencies arose a couple of times that did not allow the keeper that had written the table top exercise to present it. This challenge was solved by the zoo school instructor taking on running the tabletop exercise. The field trips also ran into some hiccups due to not all the areas being able to accommodate the amount of people in the groups.

A challenge that was pervasive across the entire program was the scheduling of everything. The plan was to do the instruction twice a week, but what was not taken into account originally were days that were needed for exams, snow days, holidays, and spring break. Luckily, there had been some days at the end of the course that the plan was to do whole class training demonstrations that could be cancelled or used substituted for the original field trip.

Future Possibilities and Conclusions

Overall, the program was considered a success for the zoo school program at the Columbus Zoo and was continued on to the next year. However, it is believed that this program with some slight alteration could be used for new keepers, seasonal keepers, interns, and potentially turned into a paid experience which would allow other institutions to incorporate it into their programming even if they do not have a high school on grounds.

Although some new keepers come in with some knowledge of training, it more often than not is limited to a couple of species. This program can allow these keepers to fine-tune their skills, while also introducing them to how the training program works at the institution. It can be fine-tuned enough to include how much or how little information is required for a training plan, who would need to approve the training plan, all the while giving the supervisor an idea of the training knowledge the keeper contains.

Seasonal employees and interns are often the next generation of keepers at a facility. Applying this program to this group of individuals will not only allow them to gain a better understanding of training animals, but just like a new keeper it will give managers an idea of aptitude for training that the individual possesses.

One of the things that guests love to see are training sessions with animals. Whether these are formal “shows” or are just impromptu sessions that keepers have, seeing animals engaged, or sometimes not engaged, tends to bring crowds. If there was greater emphasis on the second part of the course the course could potentially be shortened into a day course that guests could sign up for and learn animal behavior that they could potentially apply to their own lives with pets. It would also offer a much more intimate experience seeing animals up close and learning about them, and building a connection that could inspire them to save wildlife.

Pivot for Profit

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It has been said that change is the only thing constant in the world, so AAZK chapters must be flexible and adaptive to be successful. The Point Defiance chapter of AAZK would like to highlight several ways they were able to pivot their operations and fundraising to remain active and successful through changing times. Their Owl Together Now fun run, their new format for Party for Polar Bears fundraiser, and bowling pin contest, among other things, are examples of how dedicated members and good leadership kept the chapter going strong.

Pivot for Profit

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"Nothing remains still. You cannot step twice into the same stream."
~Heraclitus

The familiar adage, "change is the only constant," rings true for many AAZK chapters with long histories of remaining active through tumultuous times. How have these chapters stayed relevant to their communities and membership against this ever-changing backdrop? The Point Defiance chapter of AAZK would like to share some of the ways we are successfully navigating changing times through flexibility, embracing new ideas, and supporting our passions.

One of the most glaring examples of an event that incited change across the globe is, of course, the pandemic resulting from COVID-19, which impacted seemingly every aspect of life. Though our exact struggles differed depending on state and community reactions, each AAZK chapter dealt with similar issues, possibly the foremost of which was a ban on public gathering. As an organization based on collaboration and building connection, our chapter needed to tackle this obstacle before moving forward. The first month of the restrictions, we "met" using a live document that each member could use to post their comments and reactions to agenda items, but it was clear we needed a video conferencing platform. Like nearly all chapters, we opened a Zoom account and resumed our meetings virtually. Today, though the ban on gathering is long over, we chose to retain the option of attending our meetings via Zoom, because we realized they had become more accessible for those with transportation or child care limitations.

As spring of 2020 arrived, it became clear that our usual Bowling for Rhinos gathering would not be tenable, nor would the accompanying raffle we had found to be profitable in the past. One of our members suggested an alternative fundraiser that was definitely outside of our usual repertoire. The AAZK chapter at his previous institution had organized a bowling pin decorating contest, wherein participants paid to register for a bowling pin (used pins donated by local bowling alleys) and then decorated it however they desired and returned it to enter it in the competition. So in the summer of 2020, we held our first bowling pin decorating contest, and the results were phenomenal. Participation was high, the artwork was stellar, and we were able to display the bowling pins in the education center at our facility as well as set up online voting.

Additionally, we felt we needed to replace our usual in-person raffle with something feasible during a pandemic. As many AAZK chapters have done, we moved to an online platform to facilitate an auction. This, combined with our earnings from the bowling pin contest, shattered our previous Bowling for Rhinos donation record. Since 2020, we have continued the bowling pin decorating contest with enormous success, setting new records every year.

Another example of how our chapter has been able to thrive in times of change and uncertainty is our fun run fundraiser. In the spring of 2021, a full year after the pandemic eclipsed seemingly all aspects of life, one of our members floated the idea of doing a virtual 5k fundraiser. At first it sounded a little odd. Why would people pay to go on a 5k run by themselves? As it turned out, people in the spring of 2021 were looking for ways to connect with others, and still wanted to do activities similar to what they had done pre-pandemic. We had no history of organizing races, but one member took on coordinating through a fairly simple website where our participants registered and could post photos of themselves on their personal run. We called it the Owl by

Yourself 5k. It was a hit! We registered over 60 runners, and between their fees, donations and profits from t-shirt sales, we made over $2,800.00. The main reason this event succeeded is that it filled a hole in people's lives that had been created by the pandemic's restrictions.

The event was fun, profitable, and we liked it so much, we wanted to do it again the following year! In 2022, with the ban on gathering lifted, we could actually run in person; we called the race Owl Together Now. This time we had hopes that the Metroparks District of Tacoma, which oversees our zoo's facility and park, would partner with us to hold the race in person. The Metroparks staff was very enthusiastic, but also very new to organizing runs. A myriad of issues stymied our planning, and in 2022, the in-person portion failed to get enough registrants to proceed (though virtual runners still participated).. We had to return people's registration fees and run the race grassroots style, with just a few of us meeting on our own in the park to complete the race, sans fancy timing chips, numbers, and finish line.

After that disappointment, we had decided not to partner with the Metroparks again, but they were determined to make the run happen in 2023. They enlisted a larger race organizing team, including a person who was familiar with planning large-scale races, and we took a chance on collaborating again. This time, everything came together and the Owl Together Now run came to fruition, including a 3-mile race and a 1-mile nature walk scavenger hunt in Point Defiance Park. With 70 registrations (splitting profits with Metroparks) we made just under $1,000.

With that successful partnership between Point Defiance AAZK and Metroparks of Tacoma under our belts, we were ready to approach them with an even bigger idea for 2024. What if we could hold the run at the zoo? It would be a huge draw for participants to run on zoo grounds. Ahead of our first planning meeting for the 2024 Owl Together Now fun run, we received an email from the Metroparks race team, who told us they really hoped to hold the race on zoo grounds in 2024. We were delighted.

Now with the larger community support of zoo management and operations, plus Metroparks' Parks and Recreation department, the 2024 Owl Together Now run was bigger and better than ever! Between the 3 mile run and 1 mile nature walk scavenger hunt, we hosted over 300 participants in Point Defiance park. The finish line was situated at Point Defiance Zoo & Aquarium's main plaza, where an ambassador owl greeted runners as they crossed the line. At the time of this writing, totals are still being tabulated, but we know we've set yet another record, likely tripling the proceeds from 2023!

The past four years are notable in that they applied urgent pressure to incite change, but even aside from the tumult of COVID-19, a multitude of issues could incite a chapter to need to alter their operations and think outside the box. One example of this in the Point Defiance chapter was our Party for Polar Bears fundraiser, which began in 2016 as a passion project one of our members dedicated herself to orchestrating. This event is a 'Drinking for Conservation" style event, with an additional raffle and polar bear swag for sale.

During the pandemic restrictions and for the following two years, our Party for Polar Bears events were conducted more or less as usual–with resounding success, as usual.[1] But then, unrelated to pandemic repercussions, the venue we had partnered with in 2022 and 2023 declined to partner with us in 2024. While Tacoma is full of fantastic craft breweries, taprooms, and taverns, there are few that are large enough to accommodate the 200 people who normally come out to celebrate at Party for Polar Bears, and essentially

[1] As with our Bowling for Rhinos fundraiser, we switched the Party for Polar Bears raffle to an online auction in 2021, and we paired this with a take-out beer and food event, which was so successful we broke our previous Party for Polar Bears fundraising record, earning more than $7,000. In 2022 and 2023, we were able to return fully to in-person Drinking for Conservation style events and we retained our online auction. These endeavors, plus Party for Polar Bear merchandise, continued to break fundraising records each of these years.

none of this size that also would allow minors. Because we wanted our event to be family-friendly, we ran out of venues to even approach about the possibility of hosting our iconic event.

It was time to pivot. We wouldn't be able to fit all of our attendees into one venue, but what if we enlisted multiple businesses within walking distance of one another to participate in a "crawl"? Then no single venue would need to accommodate all of our attendees, and there would be something for everyone of all ages. The idea was ambitious, but through hard work and meticulous organization, the first Party for Polar Bears: Proctor Polar Bear Crawl edition was born!

This style of fundraiser required more intensive coordination; our committee chair first approached a business district to ask their board about interest, and then we waited with bated breath for businesses to join our event. We had eight businesses in the Proctor District of Tacoma support our Polar Bear Crawl, which included an ice cream shop, toy store, clothing boutique, several eateries, and more. To make the event seem even more festive and cohesive, a local street band agreed to roam up and down the main drag, adding to the celebratory atmosphere. With the totals from these venues, plus our online auction and Party for Polar Bears merchandise, we broke our previous record and raised $9,852.62 for polar bear conservation!

Not all of our chapter's sparks of ingenuity brought such resoundingly positive results. Another instance when our chapter chose to pivot was initially an unmitigated failure. For many years, when the Point Defiance chapter had a more robust membership, we organized a sophisticated and lucrative holiday photo booth that took four members to operate, as well as some upfront funds to purchase supplies such as a digital printer, and polaroid film. However, due to changes in our zoo's onsite experiences, we were asked to cease the photo booth opportunity for several years. Then the zoo had the idea to offer a "snow globe" photo experience, and would split the profits with our AAZK chapter if we supplied a person in a mascot suit. This seemed like a wonderful opportunity to start earning big during Zoolights season again! But it wasn't. Due to a variety of factors[2], the snow globe was canceled in 2019 and our chapter did not raise any funds.

However, even though that particular endeavor didn't pan out, we continued to brainstorm possible Zoolights fundraisers that might be feasible, taking into consideration that our chapter's membership was smaller and could not support the grand photo booth we previously orchestrated. With the support of zoo management and operations, we pivoted. A photo opportunity consisting of a bench and mini train engine strung with lights was set up in a pavilion. On nights when we had two members available, one person dressed in the polar bear costume and the other interacted with the public, announcing the fundraiser and dealing with the donations. Visitors took the photos with their own phones, so the overhead cost was extremely low, and satisfaction was high. This simplified version of the booth was popular with guests, and the streamlined operation suited our chapter's capacity perfectly. In the two years we have run this fundraiser, we have raised over $10,000.

While none of these successes was the result of a single member's efforts, they were all spearheaded by a person with passion for their idea, who ignited the spark and fanned the flame. Each of these people was supported by our members and leadership, who helped these ideas come to fruition. This, possibly above all factors, was the key to remaining relevant and thriving in changing times.

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[2] The snow globe was a giant inflatable sphere, complete with swirling snow inside, and was the sole source of the failure. The globe itself was too massive to fit in the dedicated indoor space, so it needed to be set up outdoors. Additionally, the "snow," which was meant to stay in the sphere to look like a blizzard, actually swirled wildly and escaped anytime someone attempted to enter the globe. This would have littered tiny white bits across the zoo, rendering the "snow" function unusable. Outdoors in the dark without the "snow," when people stood inside for a photo, the globe looked like absolutely nothing. There was no photo opportunity to speak of, when viewed through a camera lens. To top it off, the fan that kept the globe inflated was incredibly loud. Our zoo did not use this well-intentioned addition to the Zoolights experience.

Certainly the incredible positive attitudes and dedication of our members contributed to our chapters' successes enormously, but this is not to suggest that achievements in trying times are obtained through the "bootstraps" methods of smiling and powering through no matter what. Our members experienced grief, took space for their mental health, and reflected on priorities. Though we experienced stress, anxiety, and sometimes felt like giving up, these emotions, though very real, felt fleeting, and I didn't hear our chapter saying "we can't" or "we won't." I heard, what can we do instead?" "How can I help" and "What do you need?" There will always be change and challenges, and what allows us to accomplish extraordinary things in extraordinary times is recognizing the extraordinary in each other.

Sssensational Snakes: Overcoming Fear by Inspiring Empathy

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The persistence of myths, legends, and folklore about snakes has given them one of the worst reputations in the animal kingdom. Negative social norms surrounding snakes often stem from beliefs that they threaten humans, spread disease, or conflict with living situations. These fears often result in prejudice and persecution. The zoo programs staff at the Ark Encounter's Ararat Ridge Zoo are passionate about improving perceptions of these misunderstood animals. Because live animal programs can create empathetic connections that inspire people to care for wildlife, the zoo staff created a show called Sssensational Snakes to debunk snake myths and improve perceptions of snakes. The show incorporates Akerman's (2019) five principles of inspiring empathy in animal programs: individualization, perspective-taking, modeling caring, gentle anthropomorphism, and transparency of intent. These methods can be controversial in the zoo world, but the staff wanted to study if they worked to connect guests to animals they may fear. In the summer of 2023, surveys were given to 349 guests before and after viewing the snake show to determine whether it improved their perceptions of snakes. Statistical analyses showed that the show made significant positive differences in people's perceptions of snakes, their willingness to be around snakes, and their views of the importance of snakes in the environment. Sharing the methods and results of this study can hopefully encourage and assist other zoos in creating empathy-based live animal programs to better connect their guests with feared and misunderstood animals.

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Introduction

"Snakes - why'd it have to be snakes?" Indiana Jones' famous quote and the movie's subsequent portrayal of his fearful behavior around snakes reflect many people's negative attitudes toward snakes today. Within the animal kingdom, snakes (along with spiders) provoke the most intense fear and negative emotions in humans, which then perpetuates negative stereotypes (Polák et al., 2020). Fright makes money in entertainment, and animals can elicit strong fear responses in humans (Polák et al., 2020). Animal phobias are also the most persistent mental illness in the world (Polák et al., 2020), and snake phobia is the most prevalent animal fear in the United States (Ceríaco, 2012). Additionally, snakes capture human attention faster than other animals (Stanley, 2008), so it is no mystery why snakes are often chosen to be sensationally portrayed as scary animals in culture today. In the news, snake "attacks" and other snake bite statistics are often improperly or inaccurately reported (Liordos et al., 2018). Laypeople receive most of their scientific information from mass media sources (Dahlstrom, 2014), so the methods the media uses to present information have a strong impact on the way people understand and then respond to similar scenarios in their lives (Kusmanoff et al., 2020). Once fear is learned, it is not easy to overcome (Liordos et al., 2018).

However, negative portrayals of snakes are not limited to modern media. The persistence of myths, legends, and folklore about snakes for thousands of years has given them one of the worst reputations in the animal kingdom (Ceríaco, 2012; Liordos et al., 2018). Human behavior towards animals is a result of convictions and emotions (Myers et al., 2004). Negative social norms surrounding snakes often stem from beliefs that they threaten humans, spread disease, or conflict with living situations (Jerger et al., 2022). Therefore, the common belief that snakes are evil combined with the prevalent fear of snakes results in the magnitude of snake persecution seen today. Ceríaco's (2012) and Pandey et al.'s (2016) research demonstrated that belief in folklore increased people's propensity to persecute snakes. Because snakes elicit fear and are associated with negative symbolisms around the world, there is little support for their conservation initiatives despite their beneficial ecological functions (da Silva et al., 2021).

Understanding the emotional component of human dimensions of conservation is key to garnering support for snake preservation (Castillo-Huitrón et al., 2020; Liordos et al., 2018). Unfortunately, 21.1% of reptiles are threatened with extinction - a greater number than mammals or birds (Cox et al., 2022). Primary threats include habitat loss or fragmentation, invasive species and out-competition, pollution or poisoning, and climate change (Ceríaco, 2012). Unfortunately, studies show that snakes are the most aversive type of reptile when it comes to human perceptions and consequently faces serious purposeful persecution from people in addition to other anthropogenic threats (da Silva et al., 2021; Liordos et al., 2018). For instance, in North America, rattlesnakes are collected from the wild and slaughtered in celebrations called

Rattlesnake Round-Ups (Ceríaco, 2012). Certain populations in Brazil believe all snakes are evil and exterminate everyone they find (Liordos et al., 2018). In an Australian study, 38% of people surveyed admitted to regularly attacking snakes based on fear and hate (Ceríaco, 2012). A study in Canada revealed that people will go out of their way to run over snakes on the road (Ceríaco, 2012). Today, 12% of snake species face extinction, and the trend could continue should attitudes not be reversed (Liordos et al., 2018). Populations of asp vipers (*Vipera aspis*), Hungarian meadow vipers (*Vipera ursinii rakosiensis*), and Lataste's vipers (*Vipera latastei*) have all been driven to extinction because of persecution (Liordos et al., 2018).

One institution that is advocating for snake conservation is the Ark Encounter, an attraction located in Williamstown, Kentucky. In addition to the Ark of Noah built to biblical proportions, the park offers a variety of other family-oriented activities including the Ararat Ridge Zoo. The zoo was built to educate guests about God's creation and inspire them to exercise good stewardship over the natural world (Altman, 2023). People who visit zoos develop a greater knowledge of and affinity towards nature and wildlife than those who simply read, watch, or listen to audio about these topics (Alfandre, 2022). Zoos can also create empathetic connections that inspire people to care for animals and their ecosystems (Clayton et al., 2009). Effective zoo displays influence people's emotions towards wildlife, which then results in environmentally conscious behavior (Myers et al., 2004). Those who have empathy towards wildlife are more prone to adopting conservation-minded attitudes and behaviors (Akerman, 2019). Empathy and perceived similarity to the human experience inspire a greater appreciation and concern for animals (Clayton et al., 2009). Because provoking emotional responses towards animals better associates people with nature (Akerman, 2019), the zoo offers multiple daily animal programs to connect people with animal ambassadors and instill empathy for creation. These programs include formal shows at the Animal Actors Stage (seen in Figure 1 below) as well as keeper chats, unscheduled "surprise and delight" encounters, classroom workshops, and behind-the-scenes tours. The Ark Encounter may welcome up to 10,000 visitors per day. Attendance numbers are taken at each attraction offered by the park, and the most attended add-on experience is the animal programs with 10-20% of guests participating each day. The Animal Actors Stage currently seats about 200 people, but will regularly have 300-400 guests viewing each show when standing room is included.

Figure 1

Sssensational Snakes Show at the Animal Actors Stage at the Ark Encounter

Zoo programs teams bear the primary responsibility for building empathy and emotional connections with guests (Akerman, 2019). Live animal programs are always more effective than print or video media in fostering connections with wildlife (Fuhrman & Ladewig, 2008). They serve to educate and increase awareness of conservation initiatives, but also to eliminate myths about and emotional distance from wildlife (Fuhrman & Ladewig, 2008; Jerger et al., 2022). While this may be easy to accomplish with charismatic animals like mammals and birds, which are already viewed favorably by the general public (Batt, 2009), this becomes more difficult when presenting animals many people show aversion to, like reptiles, amphibians, and invertebrates (Castillo-Huitrón et al., 2020). This is particularly true with snakes, one of the most phobic animals in the world (Souchet & Aubret, 2016). However, live animal interactions have the potential to elicit positive emotions and reduce fear (Alfandre, 2022; Jerger et al., 2022).

This challenge increases at a Christian attraction like the Ark Encounter, as many Christians are biased against snakes or view them as evil (as defined by the Bible as opposition to God and his commands) due to their connection with Satan in the Bible (Liordos et al., 2018; Stanley, 2008). According to Genesis 1 (Crossway Bibles [CB], 2001), God created a perfect world with no death or suffering. Genesis 3 (CB, 2001) then records how the devil took the form of a serpent to tempt the first humans, Adam and Eve, into disobeying God. This sin resulted in the fall of humanity and the curse upon creation, which is why death and suffering exist today. However, the Bible makes it clear that only humans are made in the image of God (CB, 2001, Gen. 1:26-27) and are capable of choosing good or evil. Snakes are just animals subject to their God-given designs and instincts. They are incapable of morality but affected by human sin.

The Ararat Ridge Zoo staff take God's dominion mandate in Genesis 1:28 (CB, 2001) very seriously. God created the snakes and other animals, so they belong to him and they glorify him (CB, 2001, Gen. 1:24, Job 12:7-10, Ps. 50:10-11, Ps. 104:24-28, Rom. 1:20, Col. 1:16-17). God protects and cares about the lives of animals (CB, 2001, Gen. 9:9-11, Ps. 36:6, Matt. 10:29, Matt. 12:11-13, Luke 12:6), so he has given us the responsibility to rule over the animals (CB, 2001, Gen. 1:26, Ps. 8:6-8, James 3:7-8). God considers our behavior towards animals a sign of our inner character (CB, 2001, Prov. 12:10, Prov. 27:23-27, Ezek. 34:2,4). He has permitted us to hunt animals for food (CB, 2001, Gen. 9:1-3, Acts 10:12-15), but we are commanded not to destroy them (CB, 2001, Deut. 22:6-7). He also commands us to provide food and rest for working animals (CB, 2001, Ex. 23:12, Deut. 25:4) and not to neglect injured or lost animals (CB, 2001, Ex. 23:4-5, Deut. 22:4). God also commands us to leave resources for wild animals (CB, 2001, Ex. 23:10-11). Snakes will be present in the future restored creation (CB, 2001, Isa. 11:6-8) where there will be no more death or suffering (CB, 2001, Rev. 21:4). The Ararat Ridge Zoo staff are extremely passionate about snakes and endeavor to improve zoo guests' perceptions of them during the animal programs using biblical principles and science.

The Sssensational Snakes show was created to debunk sensationalized myths about snakes while revealing sensational truths instead. This philosophy is in line with Ceríaco's (2012) recommendations that snake programs should focus on correcting wrong ideas about snake behavior and highlighting their usefulness to humans. Studies show that fear of snakes can be overcome, especially if a general empathy for nature is encouraged (Stanley, 2008). However, human behavior is not always rational and is instead affected by information, attitudes, beliefs,

values, and social norms (Jerger et al., 2022; Kusmanoff et al., 2020). Therefore, the show also aims to create empathy for and emotional connections with the snakes by allowing guests to touch them. While positive attitudes about snakes may increase when knowledge is increased, aversion is reduced and stronger emotional bonds are created when physical interaction is incorporated into the experience (Alfandre, 2022; da Silva et al., 2021). For children especially, touch is the most important factor in creating interest in something (Kidd & Kidd, 1994). Additionally, the staff purposefully chose visually appealing snakes for the collection, as aesthetically pleasing animals encourage attractiveness bias (Alfandre, 2022). Listed as a decimal system where sex is represented by the number of males.number of females, the Ararat Ridge Zoo snake collection at the time of study consists of 0.1 western hognose snake (*Heterodon nasicus*), 1.1 ball pythons (*Python regius*), 1.0 woma python (*Aspidites ramsayi*), 1.0 carpet python *(Morelia spilota*), 0.1 Pueblan milk snake (*Lampropeltis triangulum campbelli*), 0.1 California kingsnake (*Lampropeltis getula californiae*), 0.1 Taiwan beauty snake (*Orthriophis taeniurus*), 1.1 Brazilian rainbow boas (*Epicrates cenchria cenchria*), and 0.1 boa constrictor (*Boa constrictor*).

Sssensational Snakes is presented in narrative form, as Dahlstrom (2014) reveals that storytelling formats increase comprehension, engagement, and interest in the topics. While this method may be frowned upon in other zoological institutions in favor of strictly scientific language, non-expert audiences find narratives far more interesting and will retain the information presented far longer (Dahlstrom, 2014). Staff also utilize gentle anthropomorphism within the show. While this practice tends to be considered taboo in the zoological world as there is a hesitancy to label what is not known for certain (such as what animals are thinking and feeling), studies show that humans relate more strongly to creatures they perceive to be similar to themselves, and anthropomorphism actively creates connections between people and wildlife (Akerman, 2019). This show consistently receives the highest attendance among our multiple animal programs, and staff have often heard guests tell them about how their perceptions of snakes improved after watching the show. However, there was no solid data to reinforce the assertion that the Sssensational Snakes show was making a difference. The purpose of this independent study was to discover if the Ararat Ridge Zoo's Sssensational Snakes show is creating more pro-snake perceptions in Ark Encounter guests.

Methods

This study involved surveying Ark Encounter guests who watched the Ararat Ridge Zoo's Sssensational Snakes program both before and after the show to determine whether their perceptions of snakes changed after watching the performance. The survey questions were presented in a Google Form and can be viewed in Appendix A. They were approved on March 27, 2023, by the Miami University Research Ethics and Integrity Office under project reference number 04526e. The survey consists of 15 questions to be answered before viewing the show and 15 questions to be answered after viewing the show. There is a divide in between the two halves of the survey informing people when to pause to watch the show. The incentive for guests to complete the survey was a free painting done by the zoo's snakes. The paint used is nontoxic washable baby finger paint and is approved for use by the zoo's veterinary staff.

This study was conducted from June 1, 2023, through July 5, 2023, and covered 23 Sssensational Snakes shows, which occur at 14:15 most days the Ararat Ridge Zoo is open. An informational poster (seen in Figure 2 below) advertising the survey to guests was placed in the center of the Animal Actors Stage 15 minutes before the start of the show when zoo staff were setting up props. It contains a QR code linked to the survey and explains that those who complete the survey will receive a free painting done by the snakes upon proof of completion.

Figure 2

Image of the Poster Advertising the Sssensational Snakes Survey to Ark Encounter Guests

While the poster was being placed, a staff member put on a microphone headset to explain the survey's purpose and incentive to guests. The poster was left on center stage until the start of the show, and a staff member with a microphone would advertise the survey to the audience once more before the start of the program. Once the show began, the poster was moved to the left side of the stage and leaned against a tree stump prop.

After the show was completed, zoo staff moved the poster back to center stage and reminded everyone who took the "before" survey to complete the "after" survey. The announcer would also inform the audience that those who showed proof of completion at the end of the survey would be able to choose a free painting done by the snakes. One of the staff would have the tray of paintings ready and give them out to those who completed the survey.

All results were recorded within the Google Form as well as on connected Google Sheets, which can be viewed in Appendix B. Upon examination of responses, if a guest had only completed the

"after" survey but not the "before" survey, their response was removed from the analysis, as it did not provide the necessary comparative information.

Five questions related to snake perceptions in the "before" survey were repeated in the "after" survey so their responses could be compared for statistically significant differences. The two "yes or no" questions were:

1. Do you think snakes are evil?
2. Do you think snakes are God's creations?

The three "ranking" questions were:

1. What is your perception of snakes? This was represented pictorially and the ranks 1 (worst) through 5 (best) were labeled as 1=despise, 2=uncomfortable, 3=indifferent, 4=don't mind, and 5=like.
2. Where would you feel most comfortable with snakes living? The ranks 1 (worst) through 5 (best) were labeled as 1=nowhere near me!, 2=far away, 3=in the area, 4=within visual range of my residence, and 5=anywhere!.
3. How important do you think snakes are to their natural environment? The ranks 1 (worst) through 5 (best) were labeled as 1=unnecessary, 2=harmful, 3=not harmful or helpful, 4=helpful, and 5=necessary.

For the "yes or no" questions, chi-square tests with and without the Yates correction were performed to discover if there were statistically significant differences between the before and after-show responses. For the "ranking" questions, Mann-Whitney U-tests were run to see if there were significant differences in the "before" and "after" populations, and then the average change was calculated to see if that difference was positive or negative. Additionally, chi-square tests with and without the Yates correction were run to show whether there were significant differences in the number of guests ranking their views as 5 (best) before and after the show. The data sheets recording the statistical analyses can be viewed in Appendix C.

10 questions in the before survey and 10 questions in the after survey were related to demographics, explanations of responses (such as why they ranked their perceptions of snakes the way they did), and show feedback. These were analyzed to find possible connections between perceptions and demographics, determine the main reasons for people's liking or disliking of snakes, and improve the show for the future.

Results

A total of 349 people who viewed the Sssensational Snakes show at the Ararat Ridge Zoo completed the surveys to the standard needed for proper analysis.

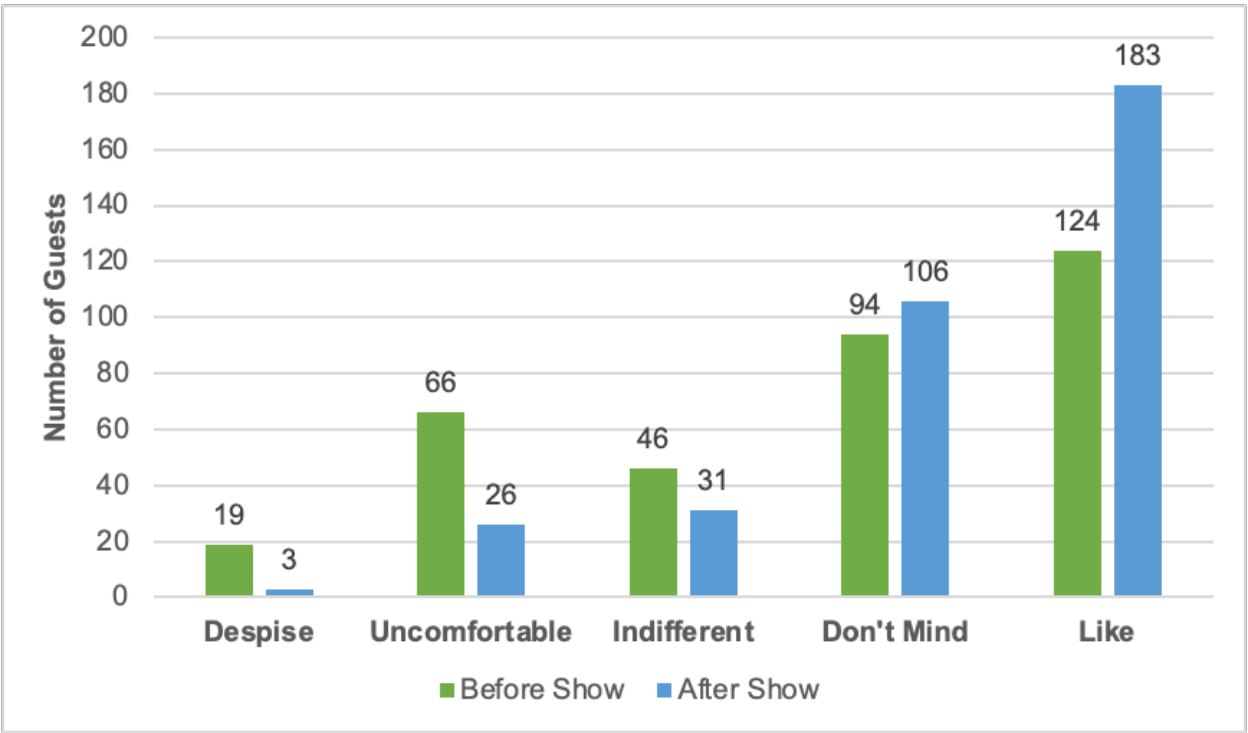
Before viewing the show, 4.9% of respondents, or 17 people, said they believed snakes are evil. After viewing the show, that percentage dropped to 1.4% of respondents or five people. To determine whether the number of people who believe snakes are evil significantly drops after viewing the show, a chi-square test using a 95% level of confidence ($\alpha = .05$) gave a chi-square statistic of 6.7238. The p-value is 0.009513, making the results significant at $p < 0.05$. Also, a chi-square test with the Yates correction using a 95% level of confidence ($\alpha = .05$) gave a chi-square statistic of 5.6472. The p-value is 0.017484, making the results significant at $p < 0.05$.

Before viewing the show, 1.1% of respondents, or four people, said they believed snakes are not God's creations. After viewing the show, that percentage and number of people did not change. To determine whether the number of people who believe snakes are not God's creations significantly drops after viewing the show, a chi-square test using a 95% level of confidence (α = .05) gave a chi-square statistic of 0.0002. The *p*-value is 0.990202, making the results not significant at $p < 0.05$. Also, a chi-square test with the Yates correction using a 95% level of confidence (α = .05) gave a chi-square statistic of 0.1179. The *p*-value is 0.731351, making the results not significant at $p < 0.05$.

Comparisons of guest perceptions of snakes before and after viewing Sssensational Snakes can be seen in Figure 3 below.

Figure 3

Comparison of Ararat Ridge Zoo Guest Perceptions of Snakes before and after Viewing the Sssensational Snakes Show

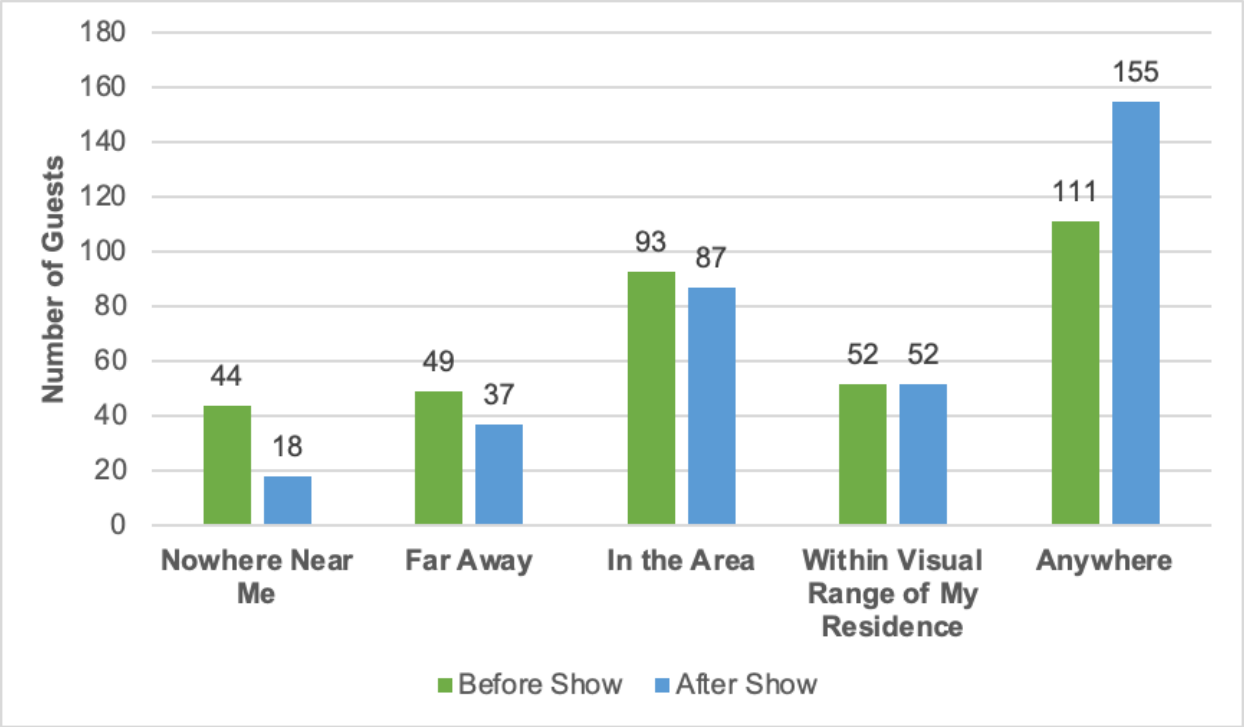


A Mann-Whitney U-test on guest snake perceptions before and after the show using a 95% level of confidence (α = .05) revealed a U statistic of 45683.5. The *p*-value is 1.11075E-08, making the results significant at $p < 0.05$. The average change in perception between the before and after populations is +0.573065903, meaning there is a significant increase in overall guest snake perceptions following the show. To reveal whether there was a significant difference in the number of people who ranked their perception of snakes as the most favorable (5 - like) after viewing the show, a chi-square test using a 95% level of confidence (α = .05) gave a chi-square statistic of 20.2416. The *p*-value is <0.00001, making the results significant at $p < 0.05$. Also, a chi-square test with the Yates correction using a 95% level of confidence (α = .05) gave a chi-square statistic of 19.5612. The *p*-value is <0.00001, making the results significant at $p < 0.05$.

Comparisons of how comfortable guests feel around snakes before and after viewing Sssensational Snakes can be seen in Figure 4 below.

Figure 4

Comparison of Where Ararat Ridge Zoo Guests Would Feel Most Comfortable with Snakes Living before and after Viewing the Sssensational Snakes Show

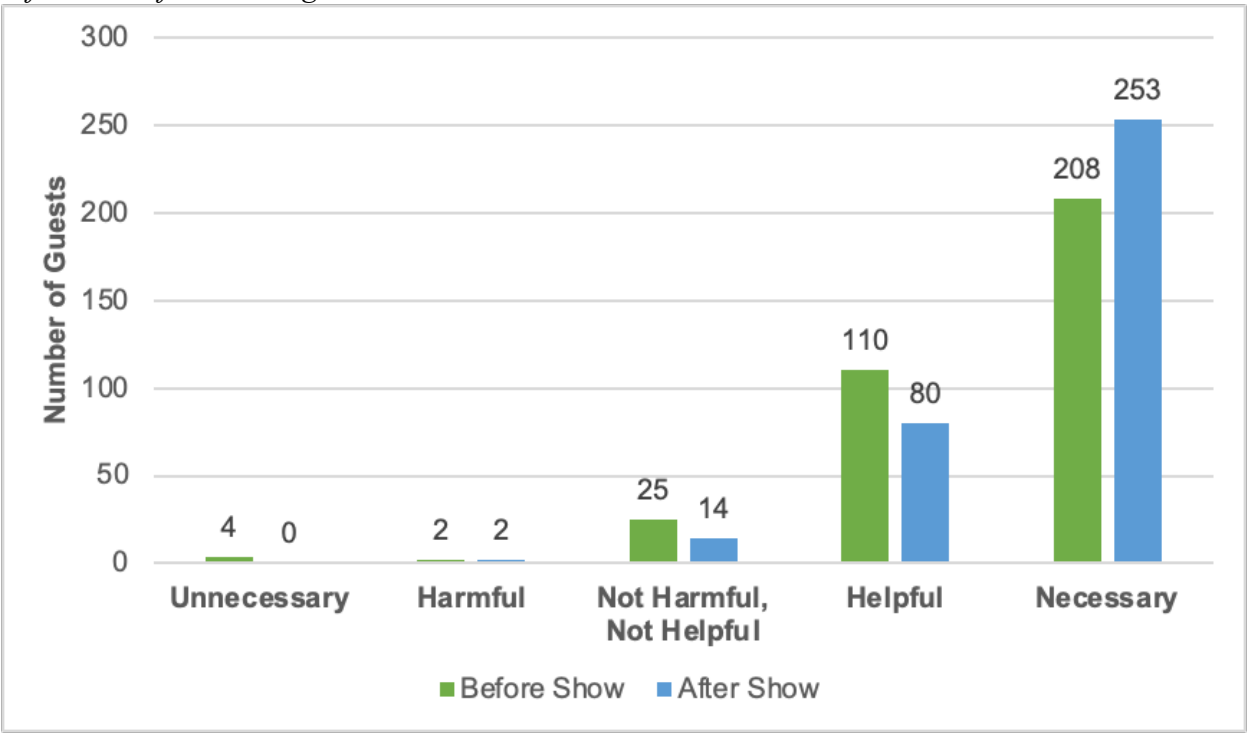


A Mann-Whitney U-test on guest snake proximity comfort before and after the show using a 95% level of confidence (α = .05) revealed a U statistic of 50211.5. The *p*-value is 5.99648E-05, making the results significant at $p < 0.05$. The average change in comfort level with snake proximity between the before and after populations is +0.438395415, meaning there is a significant increase in overall guest snake proximity comfort following the show. To see whether there was a significant difference in the number of people who ranked their comfort around snakes as the most favorable (5 - anywhere) after viewing the show, a chi-square test using a 95% level of confidence (α = .05) gave a chi-square statistic of 11.7597. The *p*-value is 0.000605, making the results significant at $p < 0.05$. Also, a chi-square test with the Yates correction using a 95% level of confidence (α = .05) gave a chi-square statistic of 11.2312. The *p*-value is 0.000804, making the results significant at $p < 0.05$.

Comparisons of how important guests think snakes are for the environment before and after viewing Sssensational Snakes can be viewed in Figure 5 below.

Figure 5

Comparison of How Important Ararat Ridge Zoo Guests Think Snakes Are for the Environment before and after Viewing the Sssensational Snakes Show



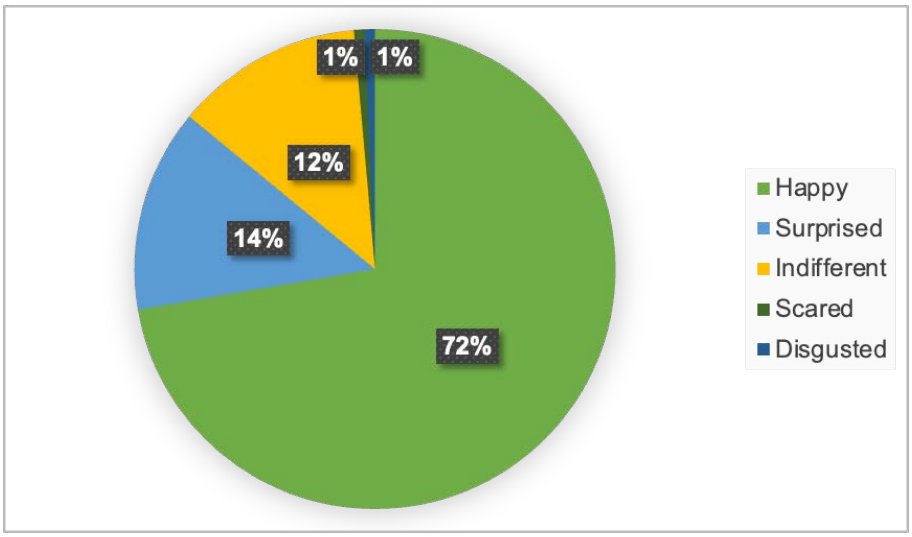
A Mann-Whitney U-test on how important guests think snakes are for the environment before and after the show using a 95% level of confidence (α = .05) revealed a U statistic of 52668. The *p*-value is 0.001997, making the results significant at $p < 0.05$. The average change in belief in snake importance to the environment between the before and after populations is +0.191977077, meaning there is a significant increase in overall guest perception of snake environmental roles following the show. To determine whether there was a significant difference in the number of people who ranked the importance of snakes as the most favorable (5 - necessary) after viewing the show, a chi-square test using a 95% level of confidence (α = .05) gave a chi-square statistic of 12.9369. The *p*-value is 0.000332, making the results significant at $p < 0.05$. Also, a chi-square test with the Yates correction using a 95% level of confidence (α = .05) gave a chi-square statistic of 12.3683. The *p*-value is 0.000437, making the results significant at $p < 0.05$.

People from 38 U.S. states plus Ontario, Canada, completed the survey. 54.6% (190 people) of respondents were female and 45.4% (158) were male; only one did not indicate their sex. 48.7% (170) of respondents lived in the suburbs, while 41.5% (145) came from rural areas and only 9.7% (34) were urban. Each living generation was represented in the survey. The most represented age group was youth 17 and under at 34.1% (119), and the least was the silent generation at 0.6% (2).

Following the program, 67.3 % (235) of guests took photos of the snakes. Feelings when photographing the snakes are reflected in Figure 6 below.

Figure 6

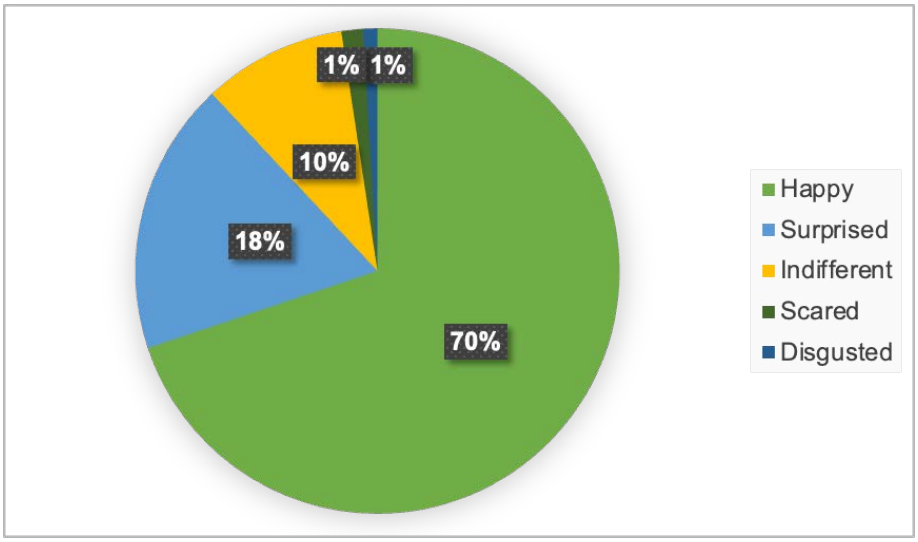
Guest Feelings while Taking Photographs of Ararat Ridge Zoo Snakes after Viewing the Sssensational Snakes Show



Additionally, after the show, 49% of respondents (171) said that they touched one of the snakes. Feelings when touching the snakes are reflected in Figure 7 below.

Figure 7

Guest Feelings while Touching Ararat Ridge Zoo Snakes after Viewing the Sssensational Snakes Show



92.3% (322) of respondents said that they planned to tell people not present at the Sssensational Snakes show about the program and what they learned. 66.5% (226) indicated that they planned to share the pictures they took with others, and 28.4% (99) said they would share those photos on social media.

Discussion

According to Morgan & Gramann (1989), to be considered successful, educational animal programs should result in positive changes in the audience's perceptions and knowledge of wildlife. The Sssensational Snakes show at the Ararat Ridge Zoo can therefore be considered a success, as it is making significant improvements in Ark Encounter guest perceptions of snakes. The number of people who believe snakes are evil drops significantly after viewing the show. Additionally, guests are significantly more comfortable around snakes and display significantly more appreciation for their role in the environment after watching the program. The data reveal that even though snakes are one of the most feared and misunderstood creatures in the animal kingdom (Alfandre, 2022), it is possible to change people's perceptions of them (Stanley, 2008). These results also support Fuhrman & Ladewig's (2008) claim that people who watch live animal shows are more likely to enact positive changes in their thoughts and behavior towards nature.

Many respondents mentioned that touching snakes themselves, even if they remained afraid, made a huge difference in their ideas of snakes. 88% (249) of the people who touched the snakes experienced positive feelings. This may be because informational messages or exposure alone have little effect on fear, but even snake-phobic people have significantly more positive attitudes about snakes after direct contact (Morgan & Gramann, 1989). Physical interaction continues to be one of the most effective methods in changing people's minds about snakes (Morgan & Gramann, 1989). Additionally, a lot of guests said that watching the handlers' calm behavior around the snakes made a big difference in their perceptions. This coincides with Morgan & Gramman's (1989) and Fuhrman & Ladewig's (2008) findings that models with non-fearful behavior around feared animals can significantly improve people's feelings towards them. The Sssensational Snakes show's method of combining exposure, information, modeling, and direct contact seems to be an ideal approach to combating negative snake stereotypes (Morgan & Gramann, 1989). People with extensive experience with and knowledge about snakes are less afraid of them (Fuhrman & Ladewig, 2008).

Previous studies discovered that women, older people, and rural communities were more fearful of snakes than men, younger people, and urban residents (Liordos et al., 2018). Women have more fear than men, possibly because they are traditionally responsible for raising children and need to have more awareness of and caution towards their surroundings (Polák et al., 2020). However, women are also more conservation-minded and tend not to support outright persecution of snakes because they traditionally view the environment and living organisms with empathy (Liordos et al., 2018). Indeed, 73.7% (14) of the 19 people who initially despised snakes in the survey were women. In contrast to literature citing that older generations tend to be more afraid of snakes, the millennial generation encompassed the majority of those who despised snakes before watching the Sssensational Snakes show at 52.6% (10). Additionally, rural people are usually less educated and therefore more influenced by folklore (Liordos et al., 2018). They also come into more conflict with wildlife and are therefore more prone to persecuting snakes (Liordos et al., 2018). In the survey, 84.2% (15) of those who despised snakes before the show were rural or suburban residents.

Examination of the reasons why people chose the initial ranking of their perceptions of snakes proved intriguing, as they are consistent with explanations for snake fear in literature. While there are components of snake fear that may be innate, studies reveal it is often a learned behavior (Stanley, 2008). Attitudes, biases, and perceptions about animals are mostly developed during childhood (Kidd & Kidd, 1994) and are a strong indicator of adulthood behavior (Jerger et al., 2022). Infants and young children are not usually afraid of snakes, but they are adept at detecting them quickly (Souchet & Aubret, 2016). However, if they have a bad experience or are shown negative media portrayals of snakes, they become predisposed to exhibiting fear responses (Souchet & Aubret, 2016). In fact, one of the respondents in this study's survey specifically listed the *Indiana Jones* movies referenced at the beginning of this paper as the reason she despised snakes. Children's attitudes towards snakes are often learned from their parents and can be developed without any snake experience of their own (Ware et al., 1994). Educational programs have the potential to improve children's perceptions of animals and increase their desire to live in harmony with them (Jerger et al., 2022). Several guests admitted that they were raised or taught to fear snakes, but that seeing the zoo's snakes and their behavior for themselves changed their perceptions of them.

Because knowledge influences the beliefs and behavior of children towards animals and their conservation, reaching children with the truth about snakes at a young age is vital (Hughes et al., 2018; Prokop & Tunnicliffe, 2008). Myths, legends, and folklore learned in childhood have a strong influence on adult behavior, and attitudes toward traditionally feared animals are highly resistant to alteration (Prokop & Tunnicliffe, 2008). Once children reach adulthood, attitudes often trump knowledge when it comes to behavior (Prokop & Tunnicliffe, 2008). Additionally, with the increasing technological advances and urbanization in our world, children's connections to nature are being severed (Hughes et al., 2018). For this reason, Sensational Snakes was created to appeal to children, so it was encouraging to see that over one-third of survey respondents were youth.

One of the primary reasons listed in the surveys for initial dislike of snakes was the belief they were slimy. This corresponds with Ware et al.'s (1994) famous disgust-avoidance model, which discovered that people tend to fear animals they find disgusting as a way to protect them from becoming sick. The false perception of snakes being slimy leads to a reaction of disgust and therefore fear (Ware et al., 1994). When people learned that snakes are not actually slimy, their ideas about them changed.

Similarly, others referenced other facets of snake anatomy as the reason for their fear. Some mentioned their lack of legs was disconcerting; others mentioned their scales. Several guests mentioned they were bothered by slithering. Interestingly, babies only associate snakes with fear in videos, not photos, which points to snakes' unique movement as a component of fear (Polák et al., 2020). This coincides with Batt's (2009) assertion that the more different animals are from humans, the more they are feared. Aposematic signals were also mentioned as a reason for concern, which coincides with Souchet & Aubret's (2016) study on the effect of warning signals on children's perception of snakes. Youth did not rank images of snakes as "mean" unless they had aposematic signals like sharp teeth, triangular heads, or zig-zag dorsal patterns (Souchet & Aubret, 2016). Zoo staff purposefully chose snake species with aposematic signals and addressed

them in the show. Further knowledge about the purpose of snake design appeared to soothe fears about them in accordance with Liordos et al.'s (2018) findings.

Another common misconception that led to snake fear was the lack of knowledge about and the inability to identify venomous snakes. The Sssensational Snakes show has an entire scene that focuses on snake behavior, the truth about venomous snakes, and snake identification. Respondents felt much more secure around snakes armed with this knowledge. Liordos et al. (2018) also determined that increased awareness of snake biology and attack behaviors greatly increases snake tolerance, attitudes, and conservation-minded behavior.

Some respondents inevitably mentioned the serpent's role in the Fall of Creation in Scripture as a reason for disliking snakes or believing them to be evil. Because this is a common argument among Christians, the Sssensational Snakes show has an entire portion dedicated to explaining snakes through the lens of the Bible. Staff informs the audience that God created snakes and declared them very good. It was Satan, not a snake, that tempted Adam and Eve into disobedience. Snakes are incapable of evil because they are not moral beings made in the image of God like humans. While snakes are associated with Satan several times in Scripture, they are also associated with salvation. In Numbers 21 (CB, 2001), God commanded Moses to erect a statue of a snake among the Israelites, and whoever looked upon it was healed. This was a foreshadowing of Christ's sacrifice on the cross (Stanley, 2008). Additionally, the staff mentions that Satan is also compared to a roaring lion, yet lions are usually not considered to be evil. Pigs were also possessed by demons in the Bible, yet again, people rarely claim pigs are evil. God also promises that in his restored creation, children will play with cobras and adders and not be harmed; if snakes were evil, they would not be present. Quite a few respondents mentioned this portion of the show being the main reason they improved their perceptions of snakes.

In the future, it would be interesting to research whether the Ararat Ridge Zoo's other animal shows are making as much of a difference in guests as the Sssensational Snakes program. Additionally, conducting a similar experiment on our Creepy Crawly encounters would be intriguing, as spiders also rank as one of the most feared creatures in the world (Polák et al., 2020). Finally, if this research were to be conducted again, the wording of some of the comparative ranking questions may be rephrased, as it appears to have caused some confusion in a few respondents.

Conclusion

While snake fear is one of the most prevalent phobias in our world today, educational programs can improve people's attitudes toward snakes. The Sssensational Snakes show at the Ark Encounter's Ararat Ridge Zoo significantly improves people's perceptions of, comfort around, and care for snakes. The incorporation of animal contact also seems to have made a strong impression on guests, even those who were fearful of snakes. This study is encouraging because it demonstrates that people's minds can be changed in favor of uncharismatic animals, which consequently leads to more conservation-minded behavior.

Not only did guest perceptions, comfort level, and environmental awareness of snakes significantly increase due to Sssensational Snakes, but many also reflected positive emotions

after viewing the show. The vast majority of respondents indicated that they experienced happiness or surprise when photographing or touching the snakes. The majority of guests also said that they planned on sharing their photos and their experiences with others in the future. These responses imply that the positive effects of the show will spread beyond the guests who viewed it, which is very exciting knowledge.

This research will be presented to the leadership of Answers in Genesis to prove that the animal programs of the Ararat Ridge Zoo are a good return on investment, as they are making a statistically significant positive difference for our guests. The information will also be used to prioritize the construction of a larger auditorium in the zoo for the animal shows. Attendance numbers are already double the seating capacity at the current Animal Actors Stage, so demand is high. Coupled with the data showing the success of just this one show, this research will hopefully inspire the expansion of our animal programs team, collection, and space to continue to benefit Ark Encounter guests for years to come. This study will also be submitted to various zoo publications for print and zoo conferences for presentations. Other animal professionals may be encouraged by this research and be inspired to conduct their own studies to determine the efficacy of their animal encounters.

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Appendix A

Link to Google Form Survey

Link to Sssensational Snakes Guest Survey

Appendix B

Link to Google Sheets Raw Data

Link to Sssensational Snakes Survey Data

Appendix C

Link to Google Sheets Data Analysis

Link to Sssensational Snakes Statistics Analysis

Behavior-based Enrichment Categories: The Goal Comes First

Ellen Vossekuil, Ochsner Park Zoo, ellenvossekuil@gmail.com

In 2022, Ochsner Park Zoo overhauled the enrichment program in order to better focus on enrichment goals. The previous program lumped enrichment items into groups based on very general similarities, such as “Sensory” or “Environmental”. The actual behavioral goals were often not being met for many animals, as each species and individual will react differently to the same item. The new program uses behavior-based categories, for example “Dig”, “Mark”, “Swim”, etc. The enrichment item is chosen specifically to illicit the desired behavior for that species or individual. The new program allows much more targeted enrichment provision to a zoo-wide variety of species, without additional time to the keeper work-load. This system can be used in conjunction with an existing enrichment program, for keepers who lack the ability to change their entire facility’s program. This program has also been tailored for use with Mexican Gray wolves, a recovery species with very restrictive enrichment requirements. The behavior-based goal categories create a focus on individual care and meeting the specific needs of each animal in a collection.

Behavior Based Enrichment Categories: The Goal Comes First

Ellen Vossekuil
Lead Keeper
Ochsner Park Zoo

Introduction and History

Ochsner Park Zoo is a municipal zoo that falls under the Baraboo Parks, Recreation, and Forestry department. The zoo is 2.5 acres and houses 70 animals in over 20 enclosures. The main collection is North American natives, with 75% of the animals coming from rehabilitation facilities or exotic pet rescue, while the remaining collection are from other zoos in partnership with Species Survival Plans.

The leadership structure at the zoo consists of Director, who oversees the entire parks and recreations department, a Zoo Manager who is at the zoo full time, and a Lead Keeper as the second full-time staff. There are also part-time Zoo Attendants, as well as interns and volunteers. Veterinary care is contracted, and there are no veterinarians or technicians employed by the city. This means that the responsibility for enrichment programs falls entirely on the Zoo Manager and Lead Keeper to create, maintain, and enforce.

When the author started employment at the facility in 2016, there was no formal enrichment plan in place, with the exception of the Capuchin monkeys. The original enrichment program was created based on experience with previous facilities, and used "traditional" enrichment categories; Sensory, Foods and Feeding, Manipulative, Environmental, and Social. These categories often start with a list of items that are approved for enrichment, and then lump them in to the categories with other items that are loosely associated with them.

This system was adequate, especially in the case where there had been no program prior. However, several factors lead to the desire to improve the program. The author often felt as though enrichment was being given just to check it off the to-do list, rather than actually addressing the needs of the animals. Items were often given that engaged the animal, but not in the way it was intended when offered. The categories often lumped items with very different end goals into the same category, which lead to confusion with people ignorant to enrichment programs, such as new interns.

In 2018, the author was introduced to the enrichment program from Cape May Zoo, which used behavior-based categories to choose enrichment. This put the "goal" of the enrichment at the beginning of the process. As an example, instead of choosing an item from the category of "Sensory", the category was instead "Mark" (or Scent Mark). The enrichment item was chosen specifically to illicit that behavior. The item might be the same (a spritz of perfume, a synthetic lure), but the method of choosing that item was much more tailored to the intended outcome of giving the item.

In 2022, the author officially updated the enrichment program at Ochsner Park Zoo to a system with goal behavior based enrichment categories.

Methods

Program Set-up

Step 1: Create universal goal behavior categories

The author used the goal behavior list created by Cape May Zoo as a starting point to create a zoo-wide list of behaviors. The previous categories of Sensory, Foods and Feeding, Manipulative, Environmental,

and Social were also divided in to more specific goals. What is the intended outcome of giving an item from the Sensory category? The answer is for the animal to use their senses. Taste, Smell, Watch, Listen, and Tactile came out of the former Sensory category. Similar extensions of the other categories added to the list of goal categories.

Step 2: Define parameters for each goal category

Each goal category then needed more specific parameters for what constitutes a "successful" enrichment. This makes sure that everyone who will use the program is judging the same metrics for evaluation.

BURROW/NEST
Collect items to create nesting area
Rest/sleep inside object or under items
Bury body in substrate
CHEW
Stimulate jaw/teeth strength and health
CLIMB/PERCH
Use structures in exhibit to change elevation or navigate habitat
Can be stable or mobile
DIG/SCRATCH
Manipulate substrate, make holes, or move substrate
Substrate in large piles or large container
EXPLORE
Disruption of established pathways, create new pathways
FORAGE
Seach for food, requires moving to many locations
Scatter feed or multiple feeding stations
GROOM/PREEN
Grooming between animals
Grooming between keeper and animal
Taking a dust bath
HUNT/STALK
Hide behind object, orienting to "prey"
Jumping/pouncing/batting "prey"
Following scent trail to prey item
LISTEN
Orient to stimulus
Attend to stimulus for an extended period of time
Changes location/body position to orient
MANIPULATE

Move or pick up objects with beak/mouth
Kick or push objects with feet/wings
MARK
Scent-marking objects
Rubbing scents onto self
PUZZLE
Extended manipulation with hands/mouth
Requires cognitive problem-solving
PLAY
Manipulating object with hands and nose/head
Does not break or tear object, not in service of obtaining food
SPAR
Uses head/horns to push object
Repeated passes at object
SWIM
Purposeful swimming (non-stereotypical)
Navigating objects under water
Manipulating object in the water
SMELL
Explore new smells
Find/track items using smell
SOCIAL
Stimulates species appropriate social behavior between individuals
Stimulates appropriate territorial behaviors from group to "outsiders"
TASTE
Exploring with mouth/tongue
Foods or scents but also textures and temperatures
TACTILE
Novel substrates for walking/resting on
TEAR
Destructible enrichment meant to be torn apart
WALLOW
Submerge in water/mud
WATCH
Visually orient to stimulus
Attend to stimulus for an extended period of time
Changes location/body position to orient

Figure 1: Universal Goal Categories with metrics

Step 3: Create species-specific lists of goal categories

Goal behaviors for each species were divided into three levels; priority behaviors, secondary behaviors, and accessory behaviors. Behaviors were put in to these categories based on multiple considerations; natural species activity budgets, exhibit constraints and features, husbandry routines, and individual animal needs (age, health, mental status, social status, etc). Some behaviors were deemed so important for animal welfare that they were transferred from an enrichment goal to a husbandry goal. For example, the enrichment behavior "Forage" was deemed a daily necessity for American Black Bears, which moved it out of the realm of enrichment and was addressed with changes to the overall daily husbandry protocol. Similar assessments were conducted for each species, which lead to several "important" behaviors being left off the enrichment lists, or modified when in the context of enrichment.

NORTH AMERICAN RIVER OTTER
Level 1: Priority Behaviors
SWIM
Purposeful swimming (non-stereotypical)
Navigating objects under water
Manipulating object in the water
PLAY
Manipulating object with hands and nose/head
Does not break or tear object, not in service of obtaining food
FORAGE
Search for food, requires moving to many locations
Scatter feed or multiple feeding stations
PUZZLE
Extended manipulation with hands/mouth
Requires cognitive problem-solving
TEAR
Destructible enrichment meant to be torn apart
CHEW
Stimulate jaw/teeth strength and health
Level 2:Secondary Behaviors
CLIMB
Use structures in exhibit to change elevation or navigate habitat
Can be stable or mobile
BURROW
Rest/sleep inside object or under items
Bury body in substrate
TASTE
Exploring with mouth/tongue

Foods or scents but also textures and temperatures
LISTEN
Orient to stimulus
Attend to stimulus for an extended period of time
Changes location/body position to orient
WATCH
Visually orient to stimulus
Attend to stimulus for an extended period of time
Changes location/body position to orient
Level 3: Accessory Behaviors
DIG
Use hands or mouth to manipulate substrate, make holes, or move substrate
Sand/dirt/bark in large piles or large container
MARK
Scent-marking objects
Rubbing scents onto self
SOCIAL
Stimulates species appropriate social behavior between individuals
Stimulates appropriate territorial behaviors from group to "outsiders"
GROOM
Grooming between animals
Grooming between keeper and animal
Self-grooming, with/on object

Figure 2: North American River Otter Goal Categories. 2.0 otters show appropriate pro-social behaviors with a minimum of stereotypical pacing or swimming. However, they do engage in some light exhibit destruction when under stimulated. Placing the goals in to the current levels are meant to keep them occupied and give them opportunities to engage in preferred behaviors in keeper-acceptable ways.

Program materials

Once the structure of the program was finalized, the details of implementation needed to be discussed. The main priorities were flexibility, and "ease of use" for choosing enrichment each morning as part of the husbandry routine. The Zoo Manager did not want a monthly calendar with prescribed goals each day, so a rotational check-off sheet was created for all species. For animals with daily or multi-day enrichment needs, a chart of 21 slots was created. Level 1 priority goals are repeated multiple times a cycle, while level 2 and 3 behaviors are used only once, or not at all, depending on animal needs. For animals with daily enrichment needs, this offers three weeks of enrichment options before the rotation re-sets. Animals with enrichment schedules of one or two times per week must rotate through each of their priority 1 and 2 goals one time before re-setting.

Check off sheets

OTTER	BEAR	FOX	SKUNK		LYNX
CHEW	PLAY	LISTEN	TASTE		BURROW
CHEW	PLAY	DIG	DIG		BURROW
CLIMB	PLAY	DIG	DIG		GROOM
BURROW	TASTE	TEAR	CLIMB		GROOM
SWIM	SMELL	TEAR	BURROW		CLIMB
SWIM	SMELL	CLIMB	BURROW		CLIMB
SWIM	TEAR	WATCH	EXPLORE		SOCIAL
FORAGE	TEAR	MARK	LISTEN		HUNT
FORAGE	PUZZLE	MARK	TEAR		HUNT
SMELL	PUZZLE	CHEW	FORAGE		HUNT
SMELL	PUZZLE	SMELL	SOCIAL		DIG
PUZZLE	PUZZLE	BURROW	SOCIAL		MARK
PUZZLE	FORAGE*	PLAY	HUNT		MARK
TEAR	FORAGE*	PLAY	FORAGE*		MARK
TEAR	SWIM	PLAY	PUZZLE		TASTE
WATCH	DIG	PUZZLE	PUZZLE		TEAR
PLAY	CHEW	PUZZLE	WATCH		TEAR
PLAY	LISTEN	TASTE	PLAY		WATCH
PLAY	WATCH	HUNT	SMELL		LISTEN
TASTE	BURROW	HUNT	SMELL		PLAY
LISTEN	BURROW	GROOM	CHEW		SMELL

Figure 3: Laminated Check- off sheet for Daily Enrichment recipients. Once a goal category is given to the animal, it is crossed off with dry-erase marker. All categories must be crossed off before the entire column is erased.

Enrichment Schedules

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
HOOFSTOCK	Pigs	Llama/Donkey			Goat/Pig		
WOODLANDS			Eagle			Eagle Deer/Birds	
BIRDS/ OWLS		Birds				Owls	Cranes
RODENTS	Rodents						
LYNX							
EDUCATION ANIMALS				Reptiles Ed Mammals			
WOLVES							

LYNX Minimum 3x/week	HOOFSTOCK Pigs Goats Llama Donkey	WOODLANDS Deer Swans Geese	BIRDS Chickens Duck Emu	REPTILES Russian Torts Sulcata Tort Snake Skink	RODENTS Prairie Dogs Beaver
		RAPTORS Eagle	OWLS Barred Owl GH Owl Snowy Owl	ED MAMMALS Guinea Pigs Opossum	

Figure 4: Enrichment Schedule for animals and exhibits that do not receive daily enrichment

Binder documents

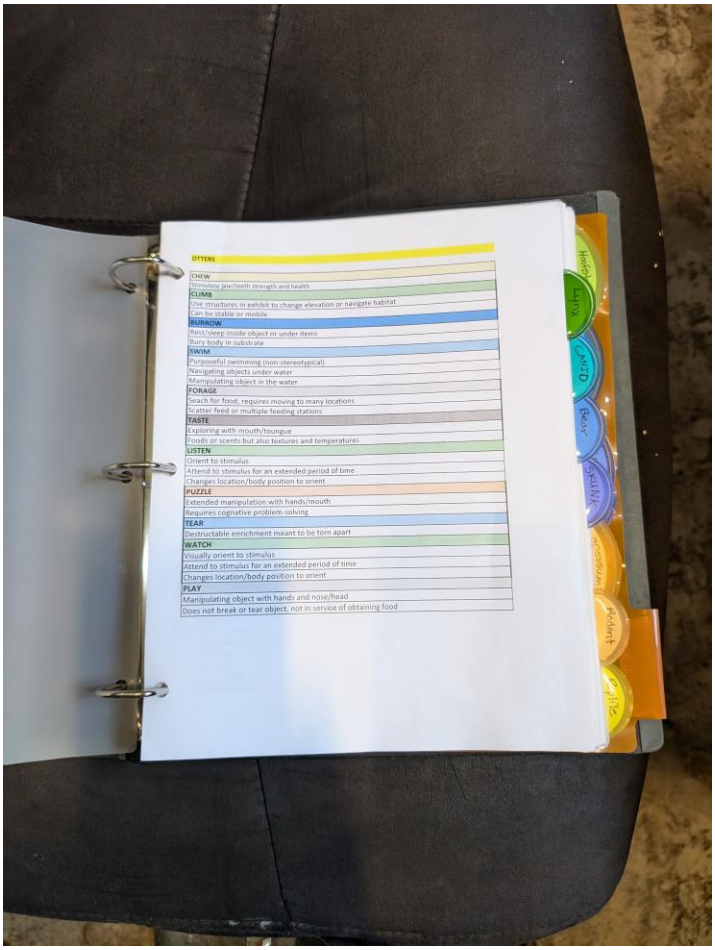

Figure 5: The enrichment binder contains printed versions of each species' list of Goal Behaviors, their definitions, and a list of approved enrichment items for reference.

Assessments and enrichment rating

Enrichment logs are still paper-based due to lack of on-site technology. The enrichment rating scale has two categories: a “Day Of” rating, which is used when the keeper directly observes the animal interacting with enrichment the day it is given. The “Next Day” category is used when there is evidence or observation of the enrichment having been interacted with overnight or the next day.

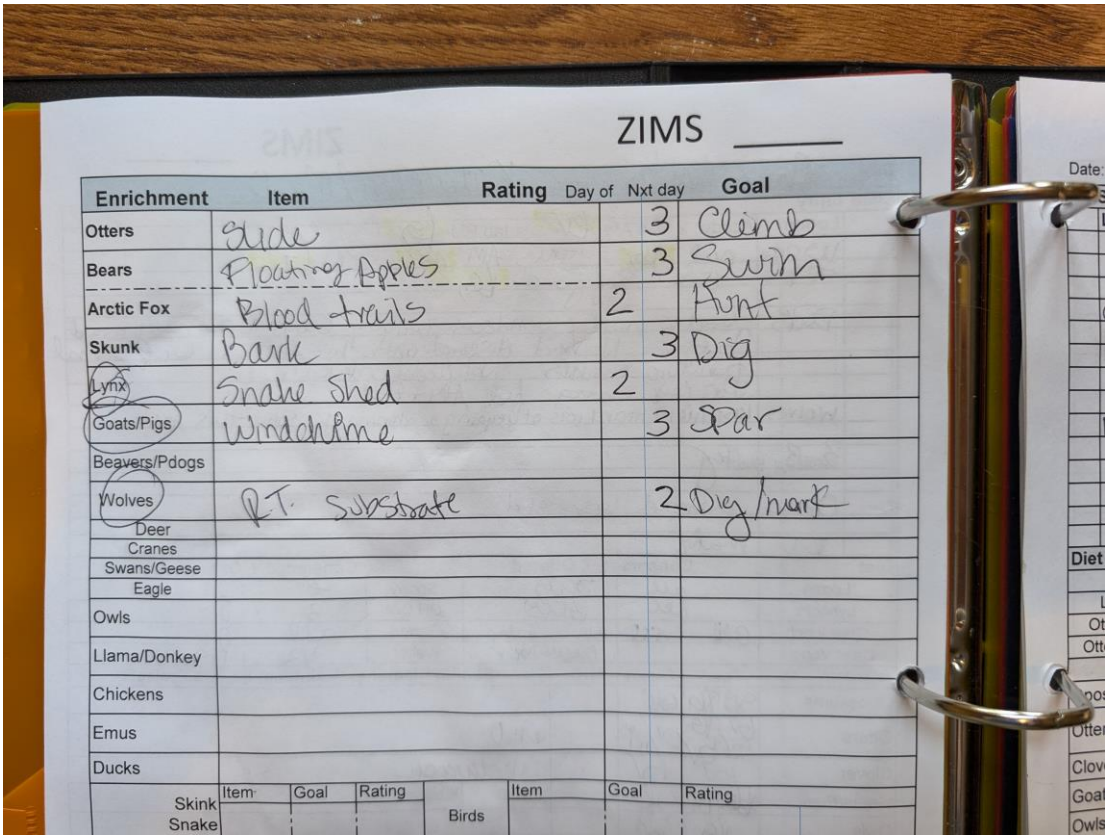

Figure 6: Example of enrichment log.

Enrichment Rating Scale:

	Immediate Rating	Next Day Rating
0 Negative reaction	*Broke the item *Item is dangerous to animal or exhibit *Caused extreme stress to animal. *Don't give in future*	*Item is broken *Don't give in future*
1 None to minimal	*Ignores item *Only acknowledge item	*Item appears untouched/unmoved
2 Medium reaction	*Interacts for several minutes *Doesn't revisit	*Evidence of some interaction; slightly moved, flipped over, dirty, etc
3 High reaction	*Interacted with item for an extended period of time *Returns to the item through the day	*Found across the exhibit, pulled in to den, deductibles are fully destroyed, still using item the next day.

Figure 7: Enrichment assessment matrix

Making Adjustments

One of the major advantages of this system of Goal Behavior Categories is that it simplifies the process of making adjustments based on changes to the animals' enrichment needs. The following is an excerpt from the Enrichment Protocol, outlining the assessment process.

Enrichment Assessment
Enrichment goals will be assessed on a quarterly basis. All behaviors will be assessed for utility, priority, and frequency based on enrichment records and staff input. New enrichment items will be discussed and approved.
For each target species:

1. Are all current behavior categories appropriate?
    a. Exhibit changes
    b. Individual behavioral needs
    c. Social behavioral needs
    d. Seasonal update
2. Added behavior categories
3. Removed behavior categories
4. Increase category frequency
5. Decrease category frequency
6. Enrichment Inventory
    a. Do we currently have items to meet all category needs?
    b. Which categories are under-represented in our inventory?
    c. What are category-specific challenges?
7. Quarterly Goals
    a. Address Inventory Gaps
    b. Update all paperwork

	Current Behavior Categories	Priority	Repetition	Added/Increase	Removed/Decrease
2	Chew	2	1		
3	Dig	1	1	10/3/23 - increase to prevent den digging???	
4	Burrow	1	2	11/5/22 - increase for winter	5/28/23 - decrese for summer months
5	Climb	3	0		1/23/22 - not necessary, need no encouragement to climb
6	Forage	2	2		
7	Puzzle	1	4		
8	Tear	1	2		
9	Smell	2	2		
10	Watch	2	1		
11	Swim	2	1	8/1/23 - did not use pool as much as last summer	
12	Listen	2	1		
13	Play	1	3		
14	Taste	2	1		
15	Hunt	3	0		
16	Groom	3	0		
17	Mark	3	0		
18					
19					
20					
21					
22					

Figure 8: Example of quarterly assessment of enrichment goals for American Black Bear.

Results

Keeper Impacts

The biggest advantage to the system for the animal care staff has been an improvement of enrichment outcomes without adding additional burden to staff time and resources. There are days each week where only one staff member is on grounds to complete husbandry, so the enrichment system needs to be efficient enough to meet the animals' goals without a significant increase in staff time over the previous system. Enrichment item preparation time remains the same, but now keepers are able to target specific animal goals in the same amount of daily effort as the previous system. The lack of a daily schedule also allows keepers flexibility based on time and opportunity. Days that are short on time can utilize goal behavior categories that are simple to execute, while days with extra staffing can incorporate more complex or time-consuming enrichment preparation. It also creates job satisfaction for keepers when the animals seem to be more engaged in their enrichment.

Animal Impacts

The system has been in place for two years at the time of this publication. In quantitative terms, there has been a noticeable trend in the ratings numbers of enrichment from frequent 1 (low level of engagement) and 2 (moderate level of engagement) to more 2 and 3 (high level of engagement) ratings over time. When an item or category has frequent 1 ratings, that means that the enrichment is not meeting the animals' needs, and is up for reassessment at the quarterly review. Over time, the system fine-tunes the needs of each individual animal to the point where they are engaging in enrichment more often, as a result of being provided enrichment that is actually more likely to engage them.

In qualitative terms, the goal-based category system seems to have increased how well the animals engage with enrichment. They are not just engaging more frequently, but are spending more time with enrichment, or expressing the goal behavior for longer or with more vigor. When the goal is at the forefront of everyone's mind, every interaction with the enrichment is judged by how well the enrichment met the goal.

Volunteer and Camp Impacts

Having a small staff means that the facility relies on volunteers for some of the enrichment preparation. There are also several times per year where Keeper Camps are run, and enrichment is prepared by campers ranging in age from 8 - 13 years old. The goal-based category system has proven to be a positive asset for those groups. It allows for a more direct pathway to the question "What do we want the animal to DO with your enrichment?" It directly focuses the choice of enrichment on the end goal of animal engagement, in a way that is simple to understand for those who are not well-versed in enrichment programs.

The program has also proven to speed up the process of training and on-boarding interns, and gives them more confidence in independently picking out enrichment and assessing animal behavior in response to enrichment.

Adjusting to Special Case Enrichment Needs: Mexican Grey Wolf

Ochsner Park Zoo is fortunate to house Mexican Grey Wolves, in partnership with the SSP. Being a recovery species potentially marked for reintroduction, the enrichment parameters are very different from a typical species under human care. Enrichment for the wolves is restricted by frequency and "natural" items that would be present in their wild environment. The goal-based enrichment categories

actually proved to be easier than the traditional program when implementing the relatively restrictive number of items that could be given to the wolves.

MEXICAN WOLF ENRICHMENT CHECK-OFF SHEET

HUNT/FORAGE

- Bury food items in substrates or snow
- Hide food in logs/branches/rocks
- Hang food items from trees
- Place food on floating item in pond
- Smears (on trees/logs/rocks)
- Skewers (sticks)
- Nuts/peanuts
- Eggs (ducks)
- Fish (live in pond)

PUZZLE

NO cardboard, PVC, plastic, metal, or cloth/firehose

- Puzzle feeders – Natural ONLY (sticks/logs with holes drilled in or hollow, pumpkins/gourds/melons, animal hides, pinecones, etc)

TEAR

No paper, cardboard, or cloth products

- Pumpkins/gourds/melons
- Heads of lettuce, other greens
- Native fruits and veggies raw (see list)
- Sticks (no scent)
- Antlers
- Pinecones

CHEW/TASTE

- Rawhides
- Dried animal hides (deer/rabbit/etc)
- Ice blocks with meat/blood
- Cooked veg (see list)
- Insects (live or dried)

MARK

All products from other animals should be frozen for 30 days to avoid cross contamination

- Urine/Feces/bedding from: black bear, lynx, fox, beaver, deer
- Hair/fur from: black bear, fox, beaver, deer, lynx
- Snake sheds
- Feathers
- Natural Scents and spices (see list)
- Christmas Trees

DIG (no scents or food)

- Natural Substrates (see list)

LISTEN/WATCH

NO music

- "Nature Sounds" rain/waterfalls/crickets etc
- Recordings of animal calls found at release sight (birds, prey species)
- Prism/disco ball (light refractions)

SOCIAL

- Owl/duck/deer decoy (prey)
- Coyote/wolf decoy (territorial)
- Recordings of animal calls found at release sight (coyotes, wolves, foxes)

Future Goals

The lack of paid staff and access to technology has restricted the ability to assess the program using hard data. Trends can only be seen by paging though paper documents, and the Quarterly Assessment spreadsheet. This leaves assessment widely open to personal interpretation and "vibes", which is not exactly scientific. In the future, the author would like to see a digitalization of the paper records, which would then allow more precise analyses of the data and trends across time. This would be especially helpful in several ways:

1. To assess the differences in animal reaction to enrichment in the "old" system verses the "new" system
2. To assess the effectiveness of the quarterly assessment over time
3. To assess the effectiveness of the Evaluation Matrix, to decide if it is accurately reflecting animal engagement with enrichment in a useful way

Conclusions

The transition to goal-based enrichment categories has been a net-positive for Ochsner Park Zoo. The animals are more engaged in their enrichment items, and the staff are able to meet the animals' goals with more efficiency.