CONSERVATION & RESEARCH

NORTH CAROLINA ZOO

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CONSERVATION

is at the heart of everything we do.

INTRODUCTION

"At the North Carolina Zoo, conservation is at the heart of everything we do. Since its inception over thirty years ago, the Zoo's conservation program has grown from a few small projects to an extensive suite of initiatives across North Carolina and around the world led by our dedicated staff. Today, our teams are working to protect threatened species and habitats ranging from amphibians and longleaf pine ecosystems in the North Carolina Piedmont to rhinos, vultures, and gorillas across Africa.

This transformation has been the result of decades of thoughtful growth, strong partnerships, and a commitment to science, community engagement, and action. What began as local efforts to safeguard our native species has evolved into a globally recognized program that trains hundreds of rangers each year, develops cutting-edge conservation technologies, and contributes directly to the survival of some of the world's most endangered animals.

As pressures on the planet intensify, the role of modern zoos has never been more critical. At the North Carolina Zoo, we believe that zoos are uniquely positioned to play a leadership role in wildlife conservation by combining expertise, innovative thinking, and trusted connections with our communities. Both our staff and the animals we care for serve as ambassadors and advocates for wildlife and wild places around the globe, helping to ensure a bright future for nature.

I am immensely proud of what the Zoo has accomplished over the last three decades and am excited to see how we will continue to protect and restore wildlife for generations to come.

— Rich Bergl, PhD, Chief Mission Officer

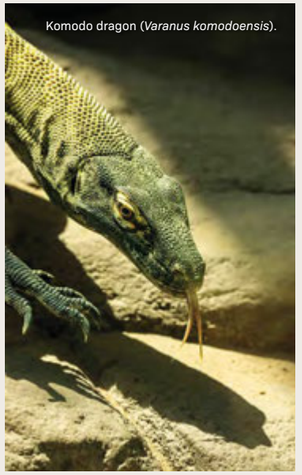
Rich Bergl, the Zoo's Chief Mission Officer, oversees the Animal, Conservation, Education, and Science sections at the Zoo.

Marbled salamander (*Ambystoma opacum*).

White rhino (*Ceratotherium simum*).

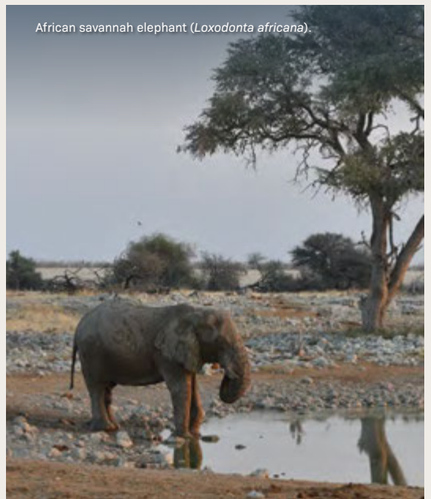
Virgin Islands boa (*Chilabothrus granti*).

American Red Wolf (*Canis rufus*).



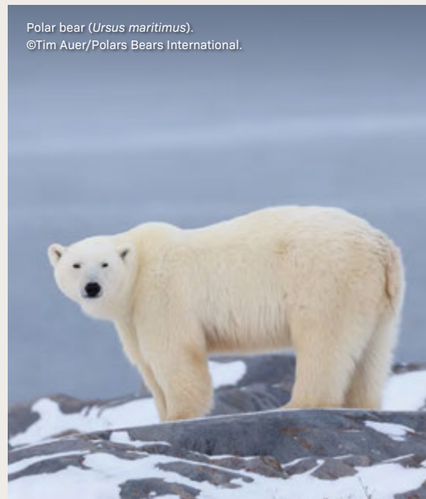
Komodo dragon (*Varanus komodoensis*).

Mountain gorilla (*Gorilla beringei beringei*).



African savannah elephant (*Loxodonta africana*).

Lappet-faced vulture (*Torgos tracheliotos*).



Polar bear (*Ursus maritimus*).
©Tim Auer/Polars Bears International.

WILDLIFE CONSERVATION

Wildlife conservation requires addressing the threats that endanger species and ecosystems, and the North Carolina Zoo is at the forefront of these efforts. Through innovative technologies, community partnerships, and scientific research, we combat poaching, reduce human-wildlife conflict, and restore vulnerable populations. From mountain gorillas in Africa to American Red Wolves in North Carolina, we are working around the world to ensure a future for wildlife and wild places.

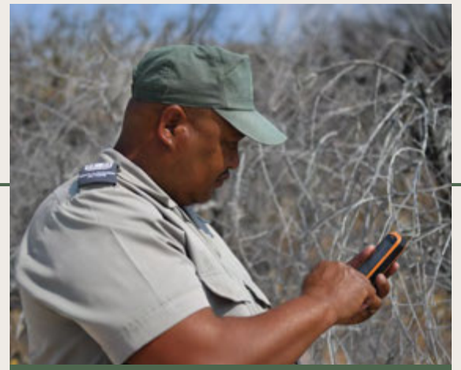
PROTECTING WILDLIFE

THE ZOO PARTNERS WITH CONSERVATION EXPERTS AND COMMUNITIES TO SAFEGUARD WILDLIFE AND WILD PLACES AROUND THE WORLD.

ADDRESSING THE THREAT OF POACHING

TOP: Rangers in Namibia review SMART data in park headquarters in order to assess patrol effectiveness and plan future activities.

BOTTOM: A ranger in Namibia collects data on a mobile phone using SMART to support conservation efforts and protect wildlife.



SMART WILDLIFE PROTECTION

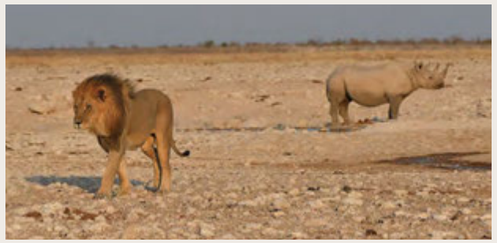
Rangers can monitor wildlife and threats, improving conservation effectiveness.

Each year, Zoo staff train hundreds of rangers and conservationists around the world in the use of SMART to improve wildlife protection and monitoring.

USING SMART TECHNOLOGY TO PROTECT WILDLIFE AROUND THE WORLD

The Zoo plays a leading role in global conservation through its leadership in the SMART (Spatial Monitoring and Reporting Tool) Partnership, an alliance of conservation organizations supporting the SMART conservation software platform. SMART, an open-source, freely accessible tool, is the world's leading solution for conservation area management, currently implemented at over 1,500 sites in more than 100 countries to help rangers and conservationists collect and analyze field data, strengthen law enforcement, and protect wildlife.

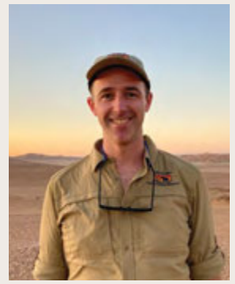
As a founding and core technical partner, the Zoo has been instrumental in developing and advancing SMART, helping shape the Partnership's strategy, as well as the platform's design and adoption across the globe. Through collaboration with seven other lead partners and hundreds of international stakeholders, the Zoo drives innovation in conservation technology to enhance data-driven decision-making. The Zoo also provides direct technical guidance, training, and financial support to more than 40 sites worldwide, ensuring that conservation teams on the frontlines have the skills and tools they need to protect critical ecosystems and endangered species.



A lion (*Panthera leo*) and black rhino (*Diceros bicornis*) in Etosha National Park, Namibia, the site of initial SMART deployment in Namibia.

A black rhino (*Diceros bicornis*) in Etosha National Park, Namibia.

> *"Working with the Zoo allows me to be part of something bigger than myself—protecting wildlife, preserving wild places, and empowering local communities. Every day, I'm reminded that conservation is not just about saving animals, but about building a future where people and nature thrive together."*
>
> — Drew T. Cronin, PhD
> *Director of Conservation, Education, and Science*



Drew leads several of our SMART efforts wildlife and wild places around the world working to protect wildlife, preserve habitats, and empower communities.

BUILDING A NATIONAL CONSERVATION SYSTEM IN NAMIBIA

In Namibia, the Zoo has worked extensively with the Ministry of Environment, Forestry and Tourism (MEFT) to establish SMART as a cornerstone of their national conservation management. Building on early successes in Etosha National Park, where SMART was first deployed to strengthen protection for black rhinos, the program has since expanded to all of Namibia's national parks. Today, SMART supports landscape-scale conservation efforts across the country, enhancing patrol coordination, data management, and decision-making. In addition to bolstering wildlife protection, the Zoo and MEFT have collaborated to launch SMART-based systems for human-wildlife conflict monitoring and game farm inspections, ensuring that the same data-driven approach used to protect endangered species is applied to broader conservation and wildlife management challenges. MEFT's expansive use of SMART represents one of the most comprehensive national SMART implementations anywhere in the world.

SMART Conservation

GLOBAL SCALE

NORTH CAROLINA ZOO SUPPORTS

- → Anti-Poaching Programs
- → Wildlife Monitoring

40+ SITES
Across Canada &
8 Countries in Africa

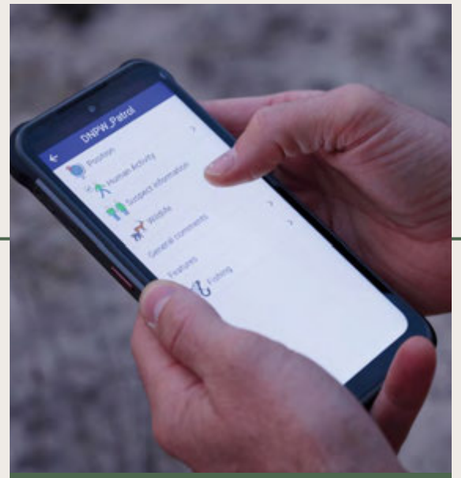
SPECIES PROTECTION

BLACK RHINOS
Namibia

LIONS, CHEETAHS & WILD DOGS
Namibia, Nigeria, Zambia & Zimbabwe

GORILLAS & CHIMPANZEES
Democratic Republic of Congo, Nigeria & Rwanda

The SMART Mobile app has made it much easier to collect data in the field.



SMART System

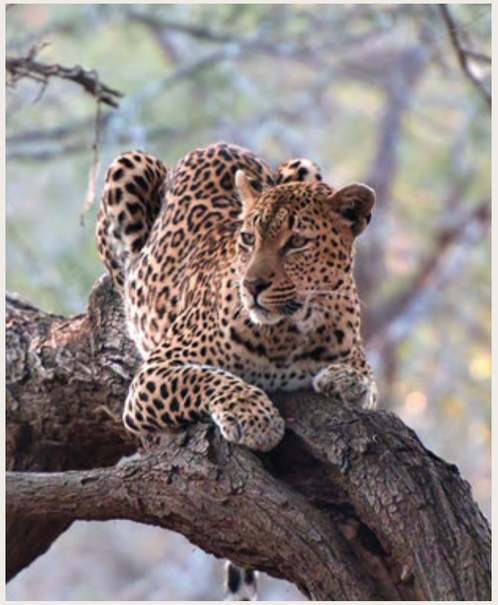
From national parks to local reserves, SMART is transforming how conservation data guides decisions on the ground.

1,500+ SITES
Using SMART Globally

OVER 100
Countries Participating

25+ NATIONS
with National Adoption

A leopard (*Panthera pardus*) in Kafue National Park, Zambia.



REDUCING POACHING IN ZAMBIA'S KAFUE ECOSYSTEM

In Zambia, the Zoo has partnered with Panthera and the Department of National Parks and Wildlife (DNPW) to implement SMART in the Greater Kafue Ecosystem, which includes Kafue National Park, one of Africa's largest protected areas and a critical stronghold for lions, leopards, and other large carnivores. Over time, SMART helped streamline patrol workflows, improve data consistency, and enhance adaptive management. This enabled DNPW to prioritize patrols and resources more effectively, focusing on areas with the highest poaching threats.

As a result, poaching activity declined significantly, with fewer snares and poachers encountered per kilometer patrolled, and lion and leopard densities either stabilized or increased across the park. Despite operating at about 20% of the cost of typical estimates for similarly large, unfenced protected areas, Panthera and DNPW's efforts have achieved measurable success. SMART has thus been instrumental in transforming Kafue's conservation management into a more efficient, data-driven, and collaborative system.

Caribou (*Rangifer tarandus*) grazing in the tundra, reflecting the types of vital wildlife observations documented through Inuit-led community-based monitoring in Nunavut.

SUPPORTING INDIGENOUS-LED WILDLIFE MONITORING IN NUNAVUT

In Canada, the Zoo has been an essential partner in advancing the Nunavut Wildlife Management Board's (NWMB) Community-Based Monitoring Network (CBMN) by providing SMART technical leadership and long-term support. Collaborating closely with Inuit partners, the Zoo's team designed and deployed a fully customized SMART database that is intuitive, bilingual (English/Inuktitut), and accessible across Nunavut's remote communities. This support enabled the transition from an expensive, proprietary system to a sustainable, community-driven platform that now empowers more than 380 Inuit harvesters across 10 communities to collect, manage, and share wildlife data.

Through the NWMB Partnership, the Zoo has helped the CBMN program become more cost-effective, scalable, and self-sustaining. More importantly, it has strengthened the NWMB's ability to make informed management decisions while reinforcing Inuit knowledge, rights, and stewardship of Arctic wildlife.

Through its global leadership and direct field partnerships, the Zoo continues to advance conservation outcomes worldwide, ensuring that technology and data empower people working to protect wildlife and wild places.

380 INUIT HARVESTERS ACROSS 10 COMMUNITIES NOW USE A SUSTAINABLE, COMMUNITY-DRIVEN PLATFORM TO COLLECT AND SHARE WILDLIFE DATA.

EYE IN THE SKY AND VULTURE RESEARCH

Vultures play a vital role in keeping ecosystems healthy. By feeding on carcasses, they prevent the spread of disease. Yet their populations are collapsing across Sub-Saharan Africa, where one of the biggest threats is poisoning. Vultures are especially vulnerable to poisoning because they alert one another when they find a carcass, causing many birds to gather at the same site. Poisoned animal carcasses on the landscape—whether motivated by human-wildlife conflict or traditional harvest—can result in the loss of over one hundred vultures from a single incident. Without urgent action, these essential birds could vanish.

To address this crisis, the Zoo helped launch 'Eye in the Sky', an international partnership using technology to protect vultures. For more than a decade, the project has fitted GPS tags on hundreds of birds across eastern and southern Africa. These devices allow scientists and local partners to track movements almost in real time, revealing where poisonings occur and guiding conservation efforts.

These data also provide new insights into vulture behavior—showing where they nest and roost, how much time they spend inside or outside protected areas, and how much space they need to survive. By leveraging science, technology, and international collaboration, Eye in the Sky is giving vultures a chance and helping safeguard the health of entire ecosystems.

Close-up view of a GPS tag on the back of a live vulture.

Vultures (*Gyps spp.*) investigate a carcass, helping researchers track illegal poisoning incidents that threaten wildlife across Africa.

Two vultures display their characteristic plumage. These scavengers' movements facilitate essential ecological services, such as carcass removal.

COMMUNITY TRAININGS EDUCATE FARMERS AND LIVESTOCK OWNERS ABOUT PESTICIDE DANGERS, WITH 300 RANGERS TRAINED TO INVESTIGATE POISONING INCIDENTS.

White-headed vultures (*Trigonoceps occipitalis*) and white-backed vultures (*Gyps africanus*) rest on a tree in East Africa. These species and others are equipped with GPS technology to help researchers track poisoning incidents. The information gleaned from tagging efforts also helps us educate communities about protecting these essential scavengers from retaliatory poisoning.

"Despite the magnitude of the crisis, the widespread decline of African vultures is a significant conservation concern rarely given the spotlight it deserves. Together with a network of dedicated organizations across Africa, the North Carolina Zoo uses modern technologies to inform and support action against the loss of these ecologically essential species."

— Storm Crews, *Associate Curator of International Conservation*

Storm leads the Zoo's vulture work and works extensively with rangers on the use of conservation technology.

VULTURES & COMMUNITY EDUCATION

We support engagement with local communities to improve education on the effects of poison and pesticides on wildlife. Empowered by this knowledge, members of these communities can enact positive change for vultures.

Poisoning events are often driven by conflicts between livestock owners and predators such as lions. We promote alternative solutions that protect livestock without harming wildlife to reduce instances of retaliatory poisoning.

A captured white-backed vulture (*Gyps africanus*) being re-released into the wild.

Community Education

helping communities understand how poisoning affects vultures and wildlife

465 COMMUNITY MEMBERS TRAINED IN 2024

1,200 HOUSEHOLDS SURVEYED THROUGH ENVIRONMENTAL EDUCATION PROGRAMS

Conservation Impact

ANTI-POACHING & WILDLIFE PROTECTION EFFORTS

- → 16 Anti-Poaching Staff
- → 4 Chimp Stewards

95,000+ HOURS PATROLLED

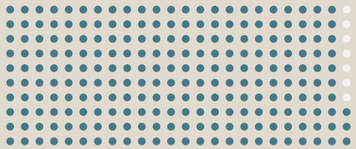
90,000+ KM COVERED

2,000+ SNARES REMOVED

ENFORCEMENT ACTIONS

68 Arrests

87 Encounters



233 Poacher Camps Destroyed

PARK INTERVENTIONS

1,600 CASES OF ILLEGAL LOGGING

69 ANIMALS REMOVED FROM SNARES

** 0.04 incidents per km patrolled.*
In partnership with Uganda Wildlife Authority.

SAVING CHIMPS BY REMOVING SNARES

Kibale National Park in Uganda hosts the highest density of primates in East Africa and is one of the last strongholds for chimpanzees in the region. However, chimpanzees in the park face constant threats from poaching and snaring, which can inflict serious injury and death. As many as one-third of chimpanzees in the park are estimated to have sustained snare-related injuries.

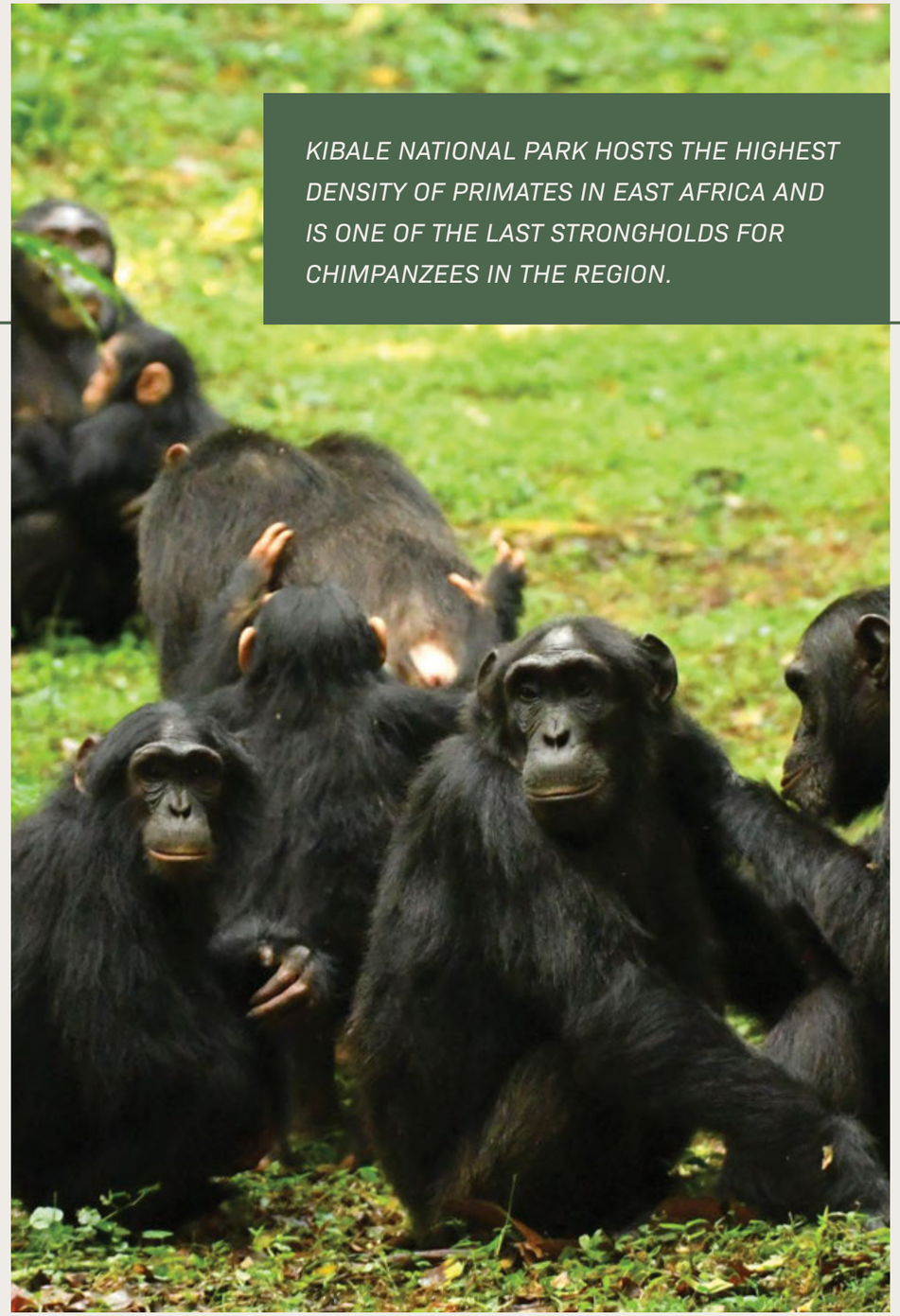
In 2010, the Ngogo Chimpanzee Project (NCP) began actively monitoring a small section of Kibale National Park, deploying a three-person team to combat illegal poaching and locate and remove snares. With support from the Zoo, this effort has since grown into a 16-person anti-poaching team whose patrols cover nearly the entirety of Kibale National Park. Additionally, NCP has a four-person chimpanzee steward team dedicated to preventing human-wildlife conflict and fostering peaceful coexistence between chimpanzees and the communities living alongside them.

The long-standing partnership between NCP and the Zoo constitutes a successful collaboration working to support the conservation of these Endangered and iconic primates.

Members of the Ngogo Chimpanzee Project's anti-poaching team on patrol. What began as a three-person monitoring effort in 2010 has grown into a 16-person team whose patrols now cover nearly the entirety of Kibale National Park.

A troop of chimpanzees (*Pan troglodytes*) in Kibale National Park. The Ngogo Chimpanzee Project's work helps ensure the survival of this forest stronghold, home to East Africa's highest density population of primates, including chimpanzees and Endangered red colobus monkeys (*Piliocolobus tephrosceles*).

KIBALE NATIONAL PARK HOSTS THE HIGHEST DENSITY OF PRIMATES IN EAST AFRICA AND IS ONE OF THE LAST STRONGHOLDS FOR CHIMPANZEES IN THE REGION.



FOLLOWING ELEPHANTS IN WEST AFRICA

Elephant populations in Central and West Africa have significantly declined due to habitat fragmentation and expanding human settlements and agriculture. As elephants are pushed into closer contact with human settlements, conflicts over space and resources have increased, leading to retaliation and killings.

The Zoo partners with Ivory Coast's Office of Parks and Reserves to support elephant conservation efforts in Taï National Park and Comoé National Park—both UNESCO World Heritage Sites and Biosphere Reserves critical to forest elephant survival in the country.

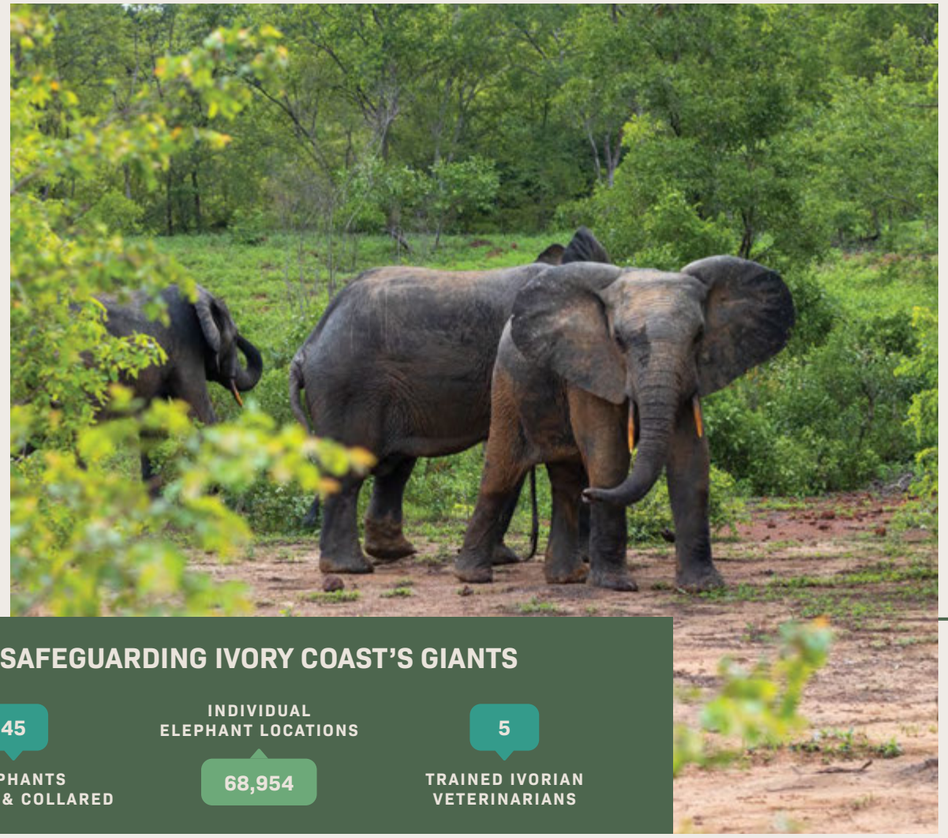
The Zoo uses GPS satellite tracking technology to monitor elephant movements and understand their habitat needs. Data from these tracking collars reveal migration routes, home ranges, and key habitats that can be conserved to reduce human-elephant conflict. This information also helps identify transboundary corridors and high-risk areas, guiding regional conservation strategies and the use of non-lethal deterrents to protect both elephants and local communities.

> *"Our work in Ivory Coast is vital for both elephant conservation and monitoring their health. By tracking their movements and identifying key corridors, we can reduce human–elephant conflict and ensure these majestic animals have the space they need to thrive."*
>
> — Jb Minter, DVM, *Director of Animal Health*

Jb and other veterinary staff from the Zoo work with partners in Africa to help track elephants to inform conservation efforts.

The elephant tracking team puts a tracking collar on an African forest elephant (*Loxodonta cyclotis*) Taï National Park, Ivory Coast.

The elephant tracking team from the Zoo and the Ivorian Office of Parks and Reserves in Taï National Park, Ivory Coast.



A rare sighting of several African forest elephants (*Loxodonta cyclotis*) in a forest clearing.

SAFEGUARDING IVORY COAST'S GIANTS

45
ELEPHANTS TRACKED & COLLARED

INDIVIDUAL ELEPHANT LOCATIONS
68,954

5
TRAINED IVORIAN VETERINARIANS

HUMAN-WILDLIFE CONFLICT MITIGATION

Humans and wildlife often inhabit the same spaces and compete for similar resources, leading to conflict. Many conservation challenges stem from human-wildlife conflict, making it essential to find innovative solutions that promote coexistence. The Zoo actively supports cutting-edge, effective solutions to human-wildlife conflict across a wide range of our international conservation projects and sites.

REDUCING CONFLICT THROUGH ALTERNATIVE LIVELIHOODS

In addition to its focus on environmental education and sustainable practices, the North Carolina Zoo's UNITE for the Environment program in Uganda is addressing human-wildlife conflict in Queen Elizabeth National Park. Unlike most protected areas, this park is designated as a Man and Biosphere Reserve and contains enclaves of villages and towns, primarily fishing and salt-mining communities, that predate the park's creation and continue to exist within its boundaries.

Due to their unique geography, these enclave communities experience disproportionately high levels of human-wildlife conflict and often have strained relationships with local wildlife authorities.

Monitoring by UNITE's wildlife stewards, who serve as liaisons with enclave residents, found that crocodile attacks on individuals engaging in illegal fishing are the most frequent form of conflict—often resulting in life-threatening or fatal injuries. With a growing population and limited economic opportunities, many enclave residents risk illegally fishing the protected nearshore waters of Lakes George and Edward.

In response, UNITE is collaborating with groups of former illegal fishers from six enclave communities to develop sustainable, income-generating work plans, such as goat rearing. These efforts aim to provide safer and more reliable livelihoods, while encouraging others to step away from dangerous and environmentally harmful fishing practices.

LEFT: A crocodile warning sign developed by UNITE to raise awareness of the threat of crocodiles to those fishing and collecting water along the shore of Lake Edward.

RIGHT: A Nile crocodile (*Crocodylus niloticus*) basks at the water's edge in Uganda.

A coalition of male lions feeding on a recent kill.

"Conservation must center people and begin by meeting them where they are. By working with communities to establish safe and sustainable livelihoods, we reduce conflict, protect wildlife and ecosystems, and foster coexistence between people and the landscapes they call home."

— Andy David, *Associate Curator of Social Science*

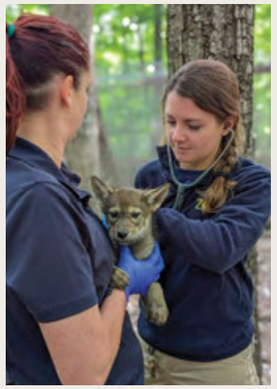
Andy oversees the UNITE program and supports the Zoo's environmental programs in North Carolina and internationally.

ENHANCING DATA-DRIVEN CONFLICT MANAGEMENT

Namibia is home to a wide variety of wildlife, and with that comes the complex challenge of managing human-wildlife conflict. This issue significantly impacts communities across the country. In 2021, Namibia adopted SMART to improve how conflict data are collected and analyzed. This has helped the government better understand the scope and scale of incidents and streamline reimbursement processes for those affected. These advancements are contributing to a more responsive and effective approach to human-wildlife conflict management in Namibia.

An African savannah elephant (*Loxodonta africana*) in a village in Namibia.

REINTRODUCTION & POPULATION RECOVERY



Zoo veterinarian, Megan Cabot, performs a wellness check on a Red Wolf pup (*Canis rufus*).

Endangered species can't wait for tomorrow's solutions. Our team is developing cutting-edge protocols while working directly with wildlife in their natural habitats to ensure long-term survival.

CONSERVING AMERICAN RED WOLVES IN NORTH CAROLINA

The Zoo is a leader in conservation efforts for the American Red Wolf, the world's most threatened wolf species, and houses the second largest zoo-managed population. With more than 95% of the remaining Red Wolf population in human care, it is critical to ensure that our management plans promote natural behaviors, maintain genetic diversity, and support superior health and longevity. The Zoo employs progressive husbandry practices to prepare wolves for successful release. Through dedicated research, the Zoo has developed protocols that minimize habituation to humans—an essential factor for survival in the wild.

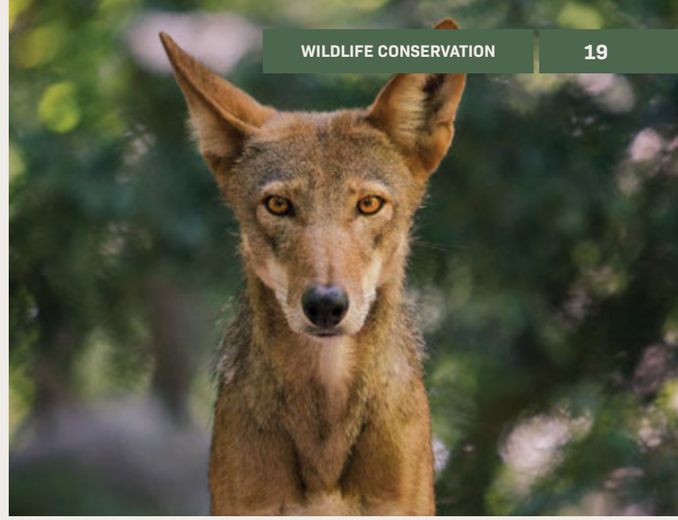
LEFT: Animal Health staff from the Zoo perform a wellness check on a Red Wolf pup.

RIGHT: A newborn Red Wolf pup at the Zoo.

95%

Roughly 95% of living Red Wolves are in human care, making each individual critical to the species' survival. Progressive management supports natural behaviours, genetic diversity, and long-term recovery in the wild.

Remote feeding boxes with battery-operated doors allow keepers to provide food without establishing human–food associations.



A Critically Endangered Red Wolf (*Canis rufus*) at the North Carolina Zoo, part of the world's rarest wolf population.

In response to growing evidence underscoring the critical role of whole prey in wolves' digestive health and overall well-being, the Zoo is implementing a new diet that focuses on food items that will promote natural feeding behaviors and prepare wolves for release into the wild.

Beyond providing excellent care, the Zoo leads multiple projects in collaboration with the Red Wolf SAFE program (learn more about SAFE programs on p. 25) and other holding facilities to improve the care and conservation of this Critically Endangered species. Research efforts focus on improving our understanding of survival trends, assessing behavioral profiles to identify suitable release candidates, and examining the connections between management programs, health, and welfare.

Red Wolf Program*

~30	Red Wolves in the Wild
241	Red Wolves in Human Care
49	Propagation and Breeding Facilities
10	Red Wolf Research Projects Led by The Zoo

** As of August 2025*

INNOVATION SPOTLIGHT

REMOTE WHOLE PREY FEEDING

THE CHALLENGE

Providing whole prey to our wolves is essential to their health, but for animals destined for wild release, it is essential to decouple associations between humans and food.

THE INNOVATION

Red Wolf keepers developed a remote feeding system using a specialized box equipped with a battery-operated chicken coop door. Keepers can set a timer to allow food access when staff are not present.

THE IMPACT

While still in the proof-of-concept phase, this system aims to eliminate the human-food connection in the animals' minds, encouraging natural behaviors. This is one of many innovations that highlight our keepers' ingenuity and commitment to animal care.

AMPHIBIAN CONSERVATION IN THE CAROLINAS

Katie Hagen holding an eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*) during a survey of the New River in western North Carolina.

MORE THAN 150 EASTERN TIGER SALAMANDER LARVAE HAVE BEEN HEADSTARTED AND RELEASED BY THE ZOO, MANY OF WHICH WERE RESCUED FROM A DEGRADED, FROZEN WETLAND.

North Carolina is home to many species of amphibians and is a global hotspot for salamander biodiversity. Conservationists at the Zoo work with partners throughout the state to protect these sensitive and ecologically unique animals.

Our regional amphibian conservation efforts focus on multiple species. In collaboration with the North Carolina Wildlife Resources Commission, we've released over 2,000 gopher frog metamorphs, a state endangered species, to aid with population recovery in the Sandhills region of the state. This work has resulted in the establishment of a new breeding population for the species.

Our team uses artificial nest boxes in the New River to monitor long-term population trends of the country's largest salamander, the hellbender. This giant salamander is facing declines across North Carolina, which have been exacerbated by lingering impacts from Hurricane Helene. Teaming up with other state agencies, staff from the Zoo assisted with a hellbender relocation project, rescuing individuals threatened by a bridge construction project.

These and other collaborative programs demonstrate the Zoo's commitment to preserving wildlife right here at home.

"I've always been drawn to the less flashy creatures—the scaly and slimy ones—and love sharing their vital roles in our ecosystems, especially in our own backyards. For over a decade, I've surveyed eastern hellbenders and spent the last four years co-leading the Zoo's nest box work in the New River. I also support headstarting efforts for gopher frogs and tiger salamanders, and help develop care protocols for Yonahlossee and frosted flatwoods salamanders."

— Katie Hagen,
Animal Management Supervisor

The Zoo is one of the few institutions successfully rearing and releasing gopher frogs.

The rare gopher frog (*Lithobates capito*) lives primarily in longleaf pine savannas of North Carolina. The frogs are now Endangered, as populations have dwindled from 50 to only seven in the state.

Tiger salamander (*Ambystoma tigrinum*), a burrowing amphibian native to North America.

Dustin Smith measuring an eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*) found during surveys of streams in western North Carolina.

Protecting At-Risk Amphibians

GOPHER FROG METAMORPHS

2,000+

Released into the wild

EASTERN TIGER SALAMANDER LARVAE

150+

Rescued for Release

HELLBENDERS

11

Moved to Safety

CONSERVATION WORK ACROSS THE CARIBBEAN ISLANDS

The Critically Endangered Puerto Rican crested toad (*Peltophryne lemur*) is the only toad native to Puerto Rico and the Virgin Islands; it is found nowhere else in the world.

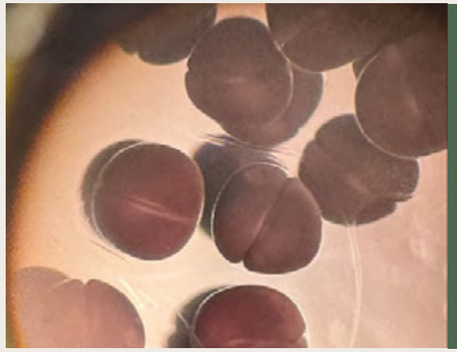
In the biodiversity hotspot of the Caribbean Islands, the Zoo works to advance the conservation of two threatened species: the Virgin Islands boa and the Puerto Rican crested toad.

Since starting our Virgin Islands boa surveys in 2018, we've encountered over 100 individuals of this Endangered species. Our surveys, which span across Puerto Rico, the U.S. Virgin Islands, and the British Virgin Islands, have led to the discovery of a new population in Puerto Rico and confirmation of a population in the British Virgin Islands.

Historic Puerto Rican crested toad breeding ponds are succumbing to degradation and saltwater inundation, hindering population stability. To address this, we are developing new breeding sites in southern Puerto Rico and have identified a location for additional ponds to bolster the success of breeding populations in the wild.

For both species, we have launched successful breeding programs, welcoming over 18 new Virgin Islands boas and releasing more than 4,000 Puerto Rican crested toad tadpoles back into the wild. These efforts are critical to maintaining viable populations and ensuring the long-term survival of these species.

Early development stages of Puerto Rican crested toad (*Peltophryne lemur*) eggs in the conservation breeding program



4,000+

Puerto Rican crested toad tadpoles released into restored habitats

A Virgin Islands boa (*Epicrates granti*) on the island of Tortola in the British Virgin Islands.

Species Recovery

The Zoo leads Virgin Islands boa research and breeding efforts throughout the Caribbean region.

SURVEY REGIONS

- → Puerto Rico
- → U.S. Virgin Islands
- → British Virgin Islands

VIRGIN ISLANDS BOAS

- 18+ BRED IN CAPTIVITY
- 100+ SURVEYED SINCE 2018
- 1 NEW POPULATION FOUND IN PUERTO RICO

"The North Carolina Zoo works closely with its valued partners to help conserve the biodiversity of reptiles and amphibians in Puerto Rico and the Virgin Islands and educate our guests about these often misunderstood animals."

— Dustin Smith, *Curator of Reptiles, Amphibians, Fish, & Invertebrates*

Dustin Smith with a Virgin Islands boa (*Chilabothrus granti*) This non-venomous, Endangered snake is among the rarest boas in the world, found only in the Virgin Islands and parts of Puerto Rico.

CONSERVING CRITICALLY ENDANGERED PACIFIC BIRDS

The Mariana Islands are an archipelago in the Pacific Ocean comprising Guam and the Northern Mariana Islands. Once home to diverse endemic species, Guam's birds fell victim to the accidental introduction of the brown tree snake in the mid-twentieth century, which drove nearly all of the island's native avian species to extinction in the wild. The North Carolina Zoo collaborates with the Mariana Avifauna Conservation (MAC) Program to prevent a similar disaster on the Northern Mariana Islands, working to translocate birds to snake-free islands and providing veterinary care for captured birds until they are released to their new homes.

Beginning in 2008, staff from the Zoo have worked with the MAC program to mitigate the spread of the brown tree snake and create assurance populations of endemic bird species on the less populated islands in the Commonwealth of the Northern Mariana Islands. In recent years, the Zoo's efforts have focused on capturing Saipan reed warblers for the first time, with the intention to translocate in the near future, and have been analyzing the genetics and health of collected Rota white-eye to establish best husbandry practices for the species.

"As our work in the Mariana islands continues to grow and expand I'm excited to be part of the hands-on conservation work with these species that don't exist anywhere else in the world. Being able to see, firsthand, the impacts of this conservation project has deepened my appreciation for my job, my local wildlife, and our future as a planet."

— Heather Scott, *Hospital Operations Manager, Animal Health*

Heather Scott and MAC partners check on captured birds in the Marianas.

TOP: A rufous fantail (*Rhipidura rufif ons*) in the wild.

LEFT: Local Marianas resident and Pacific Bird Conservation biologist, Alexi, removing a Rota white-eye (*Zosterops rotensis*) from a net.

Heather Scott assessing the condition of a Saipan reed warbler (*Acrocephalus hiwae*) during its health exam.

Monitoring Endangered Island Birds

WHAT WE'RE LEARNING ABOUT MARIANA ISLAND BIRDS

Rota white-eyes and Northern Islands reed-warblers are tiny birds with a lot to say — and fieldwork is translating their signals into action.

- → DNA from Rota white-eyes is shaping care strategies
- → Saipan reed-warblers captured for future relocation
- → Snakes and habitat loss are stalling recovery

SAMPLING TIMELINE: 2023–2025

2023 — **12 ROTA WHITE-EYES**
Established baseline data for health and genetics

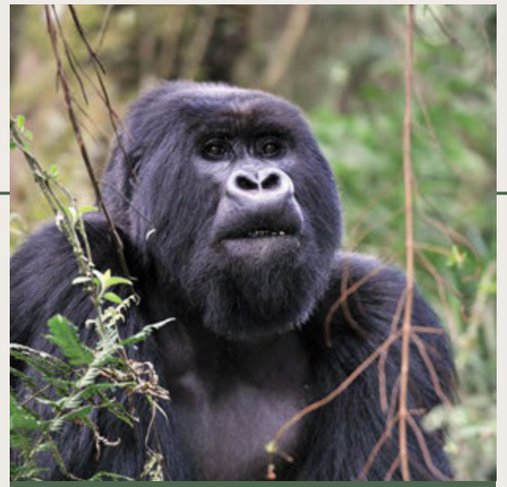
2024 — **21 SAIPAN REED WARBLERS**
Rare, isolated population assessed across fragmented habitats

2025 — **35 ROTA WHITE-EYES**
Follow-up sampling to track potential population changes

A recently banded Rota white-eye (*Zosterops rotensis*) photographed just after its release back to the wild.

SPECIES RESEARCH, MONITORING, AND PROTECTION

Mountain gorilla (*Gorilla beringei beringei*) in a high-elevation rainforest in Rwanda.



SMART Gorilla Protection

STRATEGIC SUPPORT

Protecting vulnerable gorilla populations in critical regions.

→ **Endangered**

VOLCANOES NATIONAL PARK, RWANDA

Mountain Gorillas
(*Gorilla beringei beringei*)

→ **Critically Endangered**

NKUBA CONSERVATION AREA, EASTERN DRC

Grauer's Gorillas
(*Gorilla beringei graueri*)

CENTRAL AFRICAN GORILLA CONSERVATION

The Zoo has long partnered with the Dian Fossey Gorilla Fund, a leading conservation organization dedicated to protecting gorillas and their habitats through a combination of daily monitoring, scientific research, training, and community engagement. With a mission to ensure the long-term survival of gorillas in the wild, the Fossey Fund operates in Rwanda and The Democratic Republic of Congo, focusing on both mountain gorillas in Volcanoes National Park and Grauer's gorillas in eastern DRC. In collaboration with the Zoo, the Fossey Fund is advancing conservation efforts through initiatives that enhance monitoring of gorillas and overall biodiversity, build local capacity, and support scientific research. This includes the use of SMART to strengthen biodiversity monitoring and gorilla protection in both Rwanda's Volcanoes National Park and the Nkuba Conservation Area in eastern DRC. In Rwanda, SMART helps track not only Endangered mountain gorillas but also a variety of other wildlife species, providing a holistic picture of biodiversity within the park. In eastern DRC, the Fossey Fund uses SMART to monitor and protect Critically Endangered Grauer's gorillas, while also identifying threats such as poaching and habitat degradation. By systematically collecting and analyzing data, SMART enables rangers and researchers to strengthen protection and monitoring and improve conservation decision-making.

By applying cutting-edge tools like SMART, the Dian Fossey Gorilla Fund is revolutionizing wildlife conservation to protect endangered gorillas and biodiversity across Rwanda and the DRC.

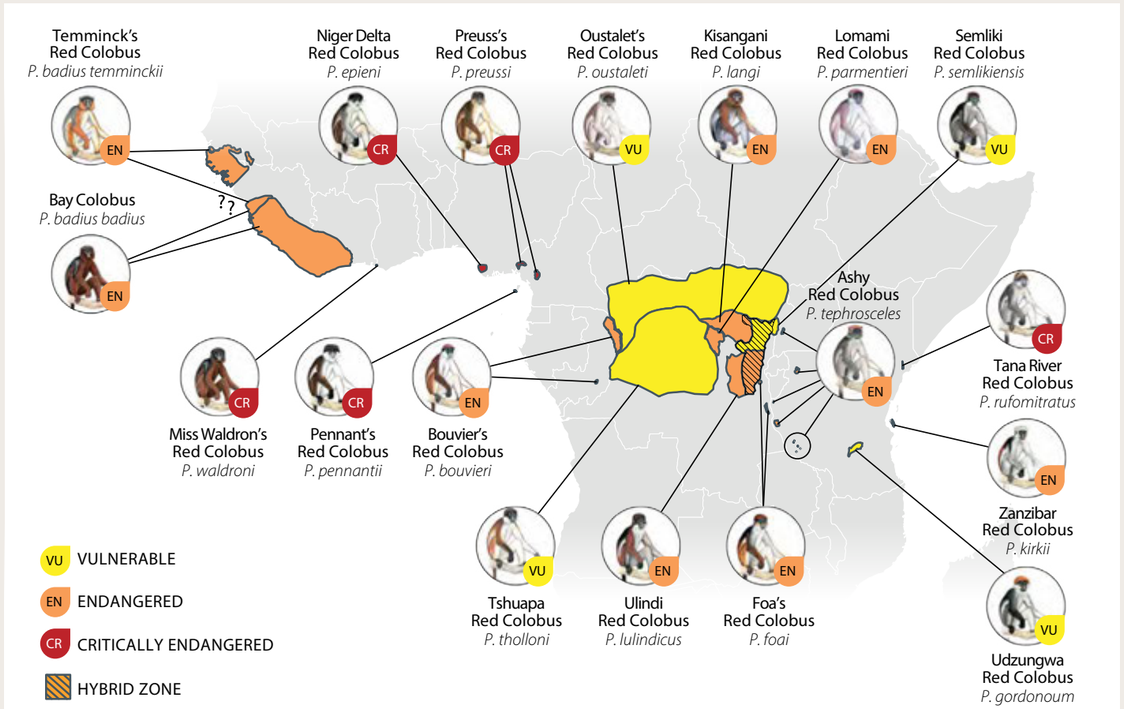
CONSERVING COLOBUS MONKEYS ACROSS AFRICA

Ranging from the forests of Senegal to the islands of Zanzibar, red colobus monkeys (*Piliocolobus spp.*) are among Africa's most threatened primates. Every species is at risk of extinction, primarily due to poaching for the bushmeat trade and widespread habitat loss.

To address this crisis, the Zoo helped lead development of the first comprehensive Red Colobus Conservation Action Plan in collaboration with the African Primatological Society and IUCN Primate Specialist Group, uniting governments, researchers, and conservationists to prevent a continent-wide extinction.

On the ground, the Zoo supports field programs protecting red colobus and their habitats across Africa, including ranger patrols for Preuss's red colobus in Nigeria, anti-poaching efforts protecting the Ashy red colobus in Uganda, and SMART patrols safeguarding Pennant's red colobus in Equatorial Guinea.

Building on this leadership, the Zoo also founded and leads the AZA Colobus Monkey SAFE Program, a collaborative initiative uniting zoos, conservationists, and in-country partners to strengthen protection for all colobus monkeys, which includes black and white colobus (*Colobus spp.*) as well. By engaging zoos that care for black and white colobus species, the program leverages their reach to build awareness, funding, and coordinated action for the conservation of all colobus monkey species in the wild, ensuring these ecologically vital primates continue to thrive in Africa's tropical forests.



AZA SAFE: SAVING ANIMALS FROM EXTINCTION

The Association of Zoos & Aquariums (AZA) Saving Animals from Extinction (SAFE) program brings together AZA member institutions and field partners to collaborate on conserving threatened wildlife, harnessing the collective expertise of AZA-accredited zoos and aquariums while engaging their audiences to help save species. The Zoo has been among the SAFE leaders, founding four SAFE programs: African vultures, American Red Wolves, Asian hornbills, and colobus monkeys. We are also partners on the SAFE programs for black rhinos, chimpanzees, eastern indigo snakes, giraffes, gorillas, monarch butterflies, North American songbirds, and whooping cranes. Through our leadership in SAFE, the Zoo is spurring collaboration among the AZA community to drive impactful conservation efforts and implement strategic actions that protect wildlife in their natural habitats.

Pennant's red colobus monkey (*Piliocolobus pennantii*) on Bioko Island, Equatorial Guinea. The Zoo is a founding member and leader of the Colobus Monkey SAFE Program.

At right are a series of representative images showcasing some of the diverse SAFE species the Zoo helps conserve in partnership with fellow AZA institutions and field collaborators.

African white-backed vulture (*Gyps africanus*)

American Red Wolf (*Canis rufus*)

Whooping crane (*Grus americana*)

Mountain gorilla (*Gorilla beringei beringei*)

Black rhino (*Diceros bicornis*) in Namibia, where much of the Zoo's work is focused on strengthening protection and management of this iconic species.

Wood Thrush (*Hylocichla mustelina*). This North American songbird species has lost over half its population in the past 50 years. SAFE North American Songbird works to protect species like this and the 318 other North American songbirds in the order Passeriformes.

Chimpanzee (*Pan troglodytes*)

Monarch butterfly (*Danaus plexippus*)

HABITAT AND LAND PROTECTION

Protecting natural lands for conservation, education, and recreation is central to the mission of the North Carolina Zoo. The Zoo stewards over 2,300 acres of ecologically significant land in North Carolina, including diverse habitats, rare species, and large continuous areas. These lands are actively managed to preserve and enhance habitat quality while balancing conservation and public use. Nearly 10 miles of public hiking trails invite visitors to explore and appreciate the unique ecological beauty of the Piedmont.

PROTECTING HABITATS

FROM FORESTS TO GRASSLANDS, THE ZOO WORKS TO RESTORE ECOSYSTEMS, SAFEGUARD WILDLIFE, AND SUPPORT CONSERVATION EFFORTS IN NORTH CAROLINA.

PRESERVING WILD PLACES IN NORTH CAROLINA

Oak-hickory forest in the Uwharrie Mountains of North Carolina. The Zoo manages many acres of this unique ecosystem, preserving it for present and future generations.

Habitat Protection

RIDGES MOUNTAIN PRESERVE
INCLUDES GRANITE OUTCROPS, RARE WETLANDS, AND UNCOMMON NATIVE PLANTS.

NICHOLS PRESERVE
PROTECTS OLD-GROWTH LONGLEAF PINE AND A FIRE-ADAPTED FOREST ECOSYSTEM.

WARD PRESERVE
CONTRIBUTES TO WATER QUALITY PROTECTION IN THE BACHELOR CREEK HEADWATERS.

PURGATORY MOUNTAIN
PROVIDES CONTIGUOUS HABITAT FOR NATIVE WILDLIFE AND RARE PLANT SPECIES.

LAND CONSERVATION

The Zoo protects over 2,300 acres of ecologically significant land across its main property and three off-site nature preserves. These large, unfragmented areas serve as vital wildlife corridors and encompass diverse ecosystems, protecting unique biological and geological features. For example, the Nichols Longleaf Pine Preserve protects the largest remaining known stand of old-growth longleaf pine in the Piedmont of North Carolina. Ridges Mountain Nature Preserve protects enormous boulders and unique rock formations, rare wetlands, and an uncommon community of plants. Ward Nature Preserve protects the headwaters of Bachelor Creek, thereby safeguarding water quality downstream. Rising above the Zoo, Purgatory Mountain protects a large, unfragmented area supporting a diversity of natural communities.

A globally rare type of upland pool on Ridge's Mountain provides excellent breeding habitat for amphibians, especially marbled salamanders and spotted salamanders. These pools are seasonal and will usually dry up during the late spring and stay dry until the next winter.

LAND MANAGEMENT & FIRE ECOLOGY

The Zoo develops and implements land management plans to guide the use and care of its natural areas to achieve conservation and sustainable use outcomes. Prescribed burns help maintain fire-adapted ecosystems, including the longleaf pine forest at Nichols Preserve and the prairie on Purgatory Mountain, a recovery site for federally endangered Schweinitz's sunflowers. Invasive species are regularly monitored and removed to protect native habitats. Managing public access is also key: rock climbing is permitted in designated areas, and over 10 miles of sustainable trails allow hikers to explore natural features while protecting sensitive plants and wildlife. A trail crew of staff and volunteers maintains existing trails and carefully plans and builds new ones.

"By protecting and managing natural lands, the Zoo supports healthy ecosystems that protect rare species, help keep common species common, and provide spaces for people to connect with nature."

— Dr. Betsy Roznik, PhD
Associate Curator of Regional Conservation

LEFT: Betsy leads the Zoo's extensive regional conservation program and manages the Zoo's conservation land.

BOTTOM: A prescribed burn is used to maintain a prairie on Purgatory Mountain that is vital habitat for the federally endangered Schweinitz's sunflower.

PRESERVING IS JUST THE START

THE ZOO USES FIRE, TRAIL PLANNING, AND INVASIVE SPECIES CONTROL TO RESTORE LAND FOR CONSERVATION AND SUSTAINABLE USE.

Protected Wildlands

MANAGED NATURAL AREAS

2,300+
Acres of Zoo-Managed
HABITAT

HABITAT RESTORATION

2 Fire-Adapted Habitats Restored with Controlled Burns

1 Old-Growth Longleaf Pine Forest—the Last Known in the Piedmont

PUBLIC ACCESS

10+
MILES
of Public Hiking Trails

Grace Sigmon, the Zoo's Regional Conservation Coordinator, holding a marbled salamander (*Ambystoma opacum*) during amphibian surveys in North Carolina.

WILDLIFE MONITORING SHOWS HOW SPECIES LIVE, CHANGE, AND IMPACT ECOSYSTEMS.

WILDLIFE MONITORING

The Zoo monitors plants and animals to guide conservation decisions and track the health of its protected areas. Field surveys, camera data, and community science efforts all help tell the story of what's thriving—and where support is needed.

MONITORING HELPS US UNDERSTAND HOW WILDLIFE USE THESE PROTECTED LANDS

Zoo biologists conduct surveys and research studies to inform conservation and land management efforts. This includes monitoring plants, wildlife, and invertebrates to inventory rare species and track populations over time. For example, salamander surveys near wetlands help identify breeding species and track their populations—leading to the discovery of the first known population of four-toed salamanders on Zoo grounds, a species of special concern in North Carolina. The Zoo also participates in community science projects to study local wildlife and contribute to large-scale scientific datasets. Through these projects, participants submit bird sightings to the NC Bird Atlas, bird reproduction data to NestWatch, and mammal observations from trail cameras to Snapshot USA.

Zoo staff conduct many different types of biodiversity surveys to inform conservation and land management efforts.

Wildlife Caught on Camera

FIELD SURVEYS

- Monitoring in Protected Areas
- Plants, Wildlife, Invertebrates
- Conservation Planning

COMMUNITY SCIENCE

- NC Bird Atlas
- NestWatch
- Snapshot USA

RECENT DISCOVERY

FOUR-TOED SALAMANDERS

Rare Salamander Recently Found on Zoo Land

CAMERA TRAPS

- Species Presence & Abundance
- Wildlife Movement Corridors
- Habitat Use

CAPACITY-BUILDING AND COMMUNITY ENGAGEMENT

The North Carolina Zoo is committed to shaping the next generation of conservation leaders. Through education, hands-on experience, and global partnerships, we equip individuals with the skills, motivation, and knowledge to drive lasting environmental change.

CONSERVATION LEADERS

THROUGH EDUCATION AND GLOBAL PARTNERSHIPS, THE ZOO EMPOWERS INDIVIDUALS TO PROTECT WILDLIFE AND INSPIRE CHANGE.

Tinka has been involved with UNITE since its inception and has been crucial to its success.

LOCAL AND INTERNATIONAL

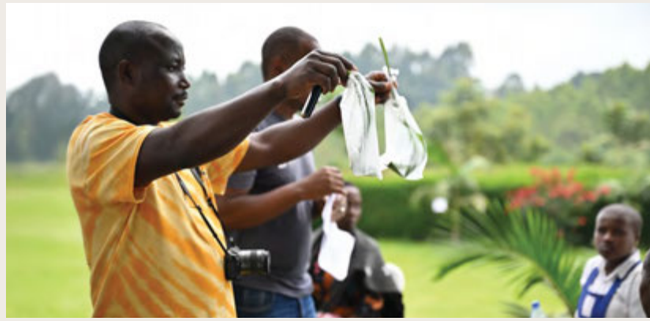
UNITE FOR THE ENVIRONMENT

Since 2002, the Zoo's UNITE for the Environment (UNITE) program has advanced environmental education, conservation, and sustainability in communities near Uganda's Kibale National Park, later expanding its reach to Queen Elizabeth National Park. Each year, UNITE trains educators from more than 20 schools, who in turn equip approximately 10,000 students with hands-on environmental skills such as composting, sustainable agriculture, and fuel-efficient stove construction. Beyond the classroom, UNITE works directly with communities to promote sustainable livelihoods and mitigate human-wildlife conflict. Evaluations show that UNITE households adopt 12 out of 13 sustainable behaviors at higher rates than control households.

"It is powerful to witness the impact of UNITE's conservation efforts, evident in the sustainable projects implemented in schools, communities, and the homes of students and teachers. By expanding our work to Queen Elizabeth National Park, we can share our long-term expertise in conservation education and support another vital ecosystem in Uganda."

— Tinka John,
UNITE Director

UNITE Staff Esther Muhindo checks in on a group of teachers during training.



UNITE's activities include teacher trainings, community events, and field trips to nearby natural areas.

UNITE Community Impact

980	260	130	715	5,600+	24
FUEL-EFFICIENT STOVES	VEGETABLE GARDENS PLANTED	BEEHIVES ESTABLISHED	BANANA TREES PLANTED	TREES PLANTED	WASTE INCINERATORS

TRAINING & EDUCATION

Real-World Training and Impact

- Students & Volunteers
- Animal Welfare Science
- Hands-On Research
- Immersive Training Programs

TRAINING FUTURE SCIENTISTS

43 Undergraduate Research Interns Trained Since 2020

ADVANCING ANIMAL WELFARE

3 Students Received a Master's Degree through the Zoo's Graduate Program

VOLUNTEER PROGRAM

The Zoo also engages the community through its volunteer program, inviting the public to participate in animal welfare focused monitoring projects across the park.

ENGAGING AND SUPPORTING STUDENTS

The Zoo supports students both locally and internationally and engages the community to advance animal welfare and conservation.

At the Zoo, our internship program trains driven undergraduates in applied research, improving animal management by exploring the connections between husbandry practices and welfare. In partnership with North Carolina State University, the Zoo offers a fully funded master's program that supports large-scale research on zoo animal welfare and fundamental scientific questions. Students gain hands-on experience in all stages of research, preparing them for careers in animal behavior and welfare science.

By supporting students and welcoming the community, the Zoo sparks real-world change in animal welfare and conservation—empowering future scientists and everyday citizens alike.

A Zoo intern collects data on elephants (*Loxodonta africana*).

"AmeriCorps helped me conceptualize and gain skills necessary for my career aspirations. I gained confidence in my abilities to effectively communicate conservation concepts to the public, as well as assist and conduct wildlife research projects. I'm grateful for my experience serving as an AmeriCorps member at the North Carolina Zoo because it has guided me towards a career in wildlife and conservation research."

— Grace Sigmon, *Regional Conservation Coordinator (AmeriCorps Alumna)*

Grace began her conservation journey as an AmeriCorps member at the Zoo, later becoming the Regional Conservation Coordinator.

AMERICORPS & FELLOWS

Previous partnership with the AmeriCorps community service program and the Zoo's new Fellowship program provide hands-on professional development opportunities for early-career conservation and education professionals. These programs also expand the Zoo's outreach, environmental education, and stewardship efforts. Since 2021, the Zoo has hosted 11 AmeriCorps members and Zoo Fellows, who have gained valuable experience and accomplished the following:

- Delivered 44 environmental education programs to 954 students at seven after-school sites, including lessons, activities, hikes, and Zoo visits.
- Connected 1,095 people with nature through 66 hikes, eight canoe paddles, and 14 community science events in the Zoo's nature preserves.
- Enhanced local environments by installing five pollination stations, four rain barrels, and organizing two creek cleanups with after-school programs.
- Increased access to nature by maintaining 10 miles of hiking trails and helping develop 3.5 miles of new trails.
- Contributed to scientific research by participating in four community science programs.

CULTIVATING A CULTURE OF CONSERVATION

"Being part of the Zoo's global conservation efforts has been exciting, motivating, and deeply rewarding. It's inspiring to see how much impact our work is having and how it connects animals, people, and communities around the world."

— Lauren Larsen,
Rocky Coast Keeper

CONSERVATION AT THE NORTH CAROLINA ZOO

Conservation is at the heart of everything we do. At the North Carolina Zoo, we provide meaningful ways for guests, volunteers, and staff to directly engage in conservation work, from participating in wildlife counts to contributing to global initiatives. These opportunities strengthen connections between people and nature while creating pathways for staff growth and development. By fostering stewardship locally and globally, we cultivate lasting connections that inspire action and help build a more sustainable future.

EMPOWERING STAFF TO MAKE AN IMPACT

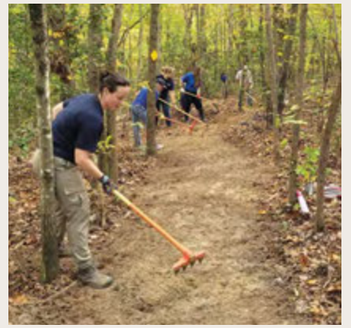
The Zoo actively encourages staff across all departments to contribute to our mission of conservation beyond their traditional roles. Through programs like SMART, regional biodiversity monitoring, land management initiatives, and other conservation projects, team members are empowered to get involved in our conservation work, helping to design and implement monitoring systems, support data-driven decision-making, and collaborate with local and international partners.

Zookeeper Lauren Larsen participates in fieldwork in Namibia as part of the Zoo's expanding conservation programs. Through the Zoo's commitment to empowering staff involvement, Lauren, and others, have become integral contributors to the Zoo's global conservation efforts.

SUPPORTING GROWTH AND EXPANDING REACH

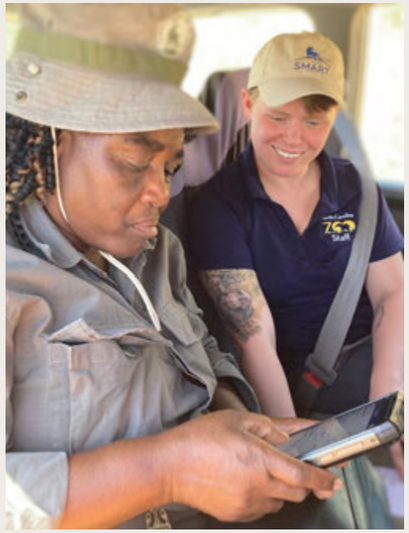
By valuing staff initiative and providing guidance, training, and resources, the Zoo enhances professional development while amplifying the reach and impact of its conservation mission. This inclusive approach ensures that everyone—from animal care specialists to administrative staff—can play a role in safeguarding wildlife and wild places, showing that meaningful conservation happens when the whole team is engaged.

Staff from across the Zoo working together to help maintain hiking trails in the Ward Nature Preserve.



Ezra Ellis, one of the Zoo's Animal Management Supervisors, holding a juvenile Komodo dragon in the field during a population assessment in Indonesia.

Shannon Rives, a primate keeper at the Zoo, trains a Namibian ranger on the use of SMART for wildlife monitoring.

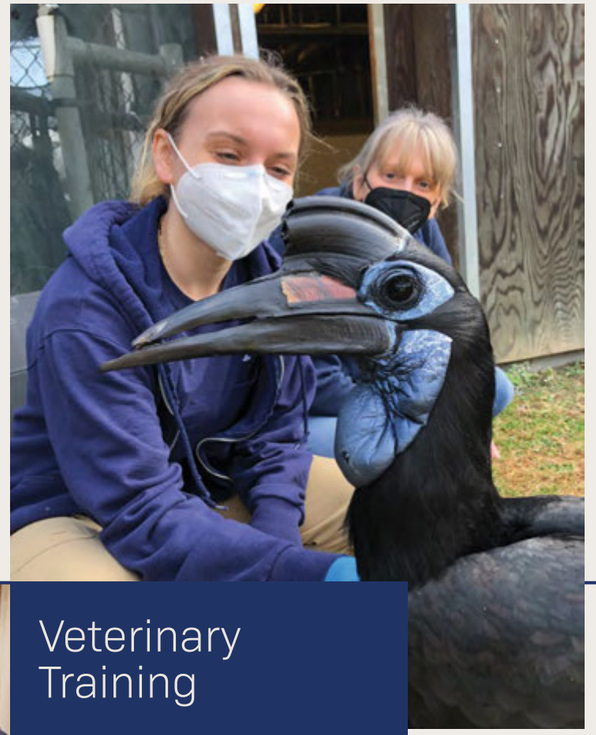


ENVIRONMENTAL AND CONSERVATION EDUCATION ARE AT THE HEART OF THE NORTH CAROLINA ZOO'S MISSION.

Zoo staff hiking on one of the trails managed by the Zoo during one of the Zoo Hiking Club events.

SUPPORTING THE NEXT GENERATION OF VETERINARIANS

The Zoo's prestigious ACZM-approved Zoological Medicine Residency, established in 1991, prepares future zoo veterinarians through three years of clinical practice, research, and leadership development. Residents engage in daily animal care—performing surgeries, administering anesthesia, conducting exams, and interpreting diagnostic results—while also advancing zoological medicine through vital research.



A veterinary resident at the Zoo with a ground hornbill (*Bucorvus leadbeateri*).

Veterinary Training

SINCE 2022

34 Students Trained

5 Veterinary Schools

SINCE 1991

41 Zoological Medicine Residency Graduates (ACZM-APPROVED PROGRAM)

SINCE 2020

40+ VOLUNTEERS Trained to Support Vital Research Projects

Zoo veterinary staff perform an examination on a zebra (*Equus quagga*) with Jb Minter, Director of Animal Health.

MENTORING THE NEXT GENERATION

Each year, the Zoo's Animal Health team also hosts final-year veterinary students from across the country for a months-long immersive experience, providing mentorship and hands-on training in essential veterinary tasks.

Zoo veterinary staff examine a Red Wolf (*Canis rufus*) pup.

LEFT: Veterinary residents extract a broken tooth from one of the Zoo's white rhinos (*Ceratotherium simum*).

Veterinary residents perform a routine examination on a lion (*Panthera leo*).

RESEARCH

The North Carolina Zoo is a hub of innovation, advancing behavioral and animal welfare science to improve the lives of animals in our care. Through cutting-edge research and evidence-based approaches, we develop new strategies for enrichment, nutrition, and habitat design that set new standards for animal well-being globally.

INNOVATING ANIMAL WELFARE

FROM PIONEERING WELFARE RESEARCH TO INNOVATIVE APPROACHES IN BEHAVIORAL SCIENCE, THE ZOO IS TRANSFORMING HOW WE UNDERSTAND AND SUPPORT ANIMAL HEALTH AND BEHAVIOR

FILLING KNOWLEDGE GAPS: WELFARE, HEALTH, AND BEHAVIORAL RESEARCH AT THE ZOO

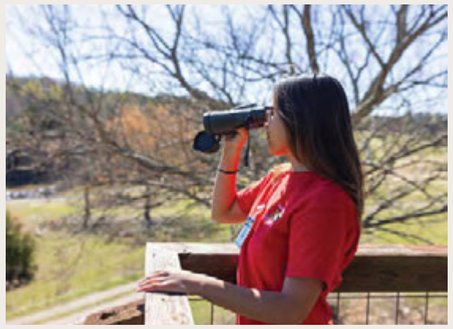
The Animal Welfare Research Program at the Zoo advances innovative methods for assessing and enhancing animal welfare. Through rigorous behavioral observation, adaptive management, enrichment, training, and physiological assessments, we develop strategies that directly inform and improve animal care.

Beyond the Zoo, we lead collaborative multi-institutional research initiatives, expanding study populations and evaluating management strategies across zoological settings. Partnering with leading academic and zoological institutions, we contribute to the broader understanding of welfare science. Our program also trains the next generation of researchers, equipping them with the skills to drive innovation in animal welfare. Since 2015, Zoo staff have authored or co-authored over 125 scientific publications.

Through publications, conferences, and outreach, we share findings with diverse audiences, reinforcing our commitment to evidence-based care and the highest quality of life for the animals in our care. The following sections highlight some of the key projects shaping how zoos worldwide approach animal welfare.

"By collaborating with universities and external partners, the North Carolina Zoo's research program mentors the next generation of scientists and pioneers new approaches to animal care, behavior, and well-being—ensuring that our research directly enhances animal welfare while shaping the future of wildlife science, conservation, and education."

— Emily Lynch, PhD,
Associate Curator of Research

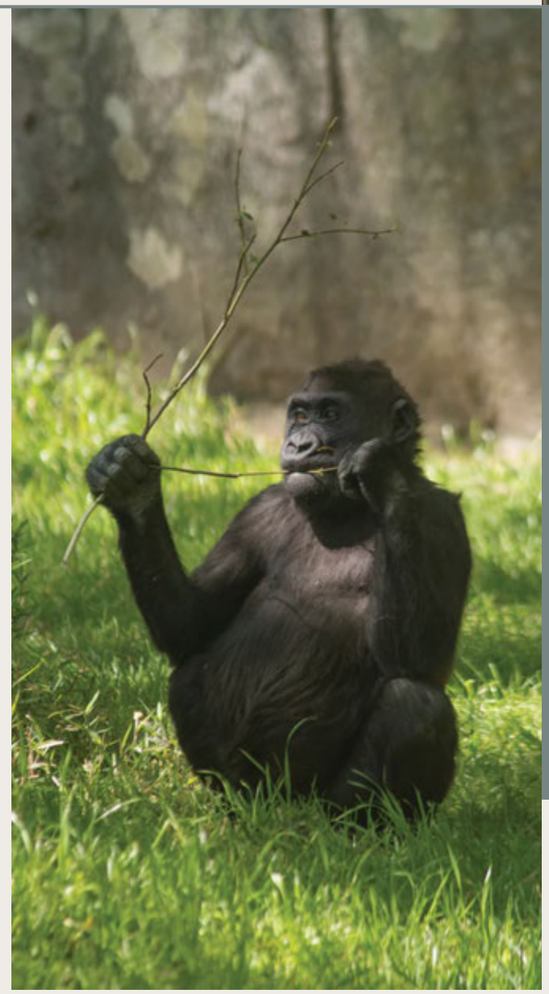


An intern within the Zoo's Research Program collects rhino and antelope space use data on the Watani Grasslands habitat.

Emily drives new discoveries in animal welfare and behavior, strengthening the Zoo's commitment to evidence-based care.

A Zoo research staff member conducts analyses on animal behavior data.

A volunteer Zoo researcher collects data on Red Wolf (*Canis rufus*) behavior using a tablet and customized software.



Research on gorillas at the Zoo has led to important insights about their diet, behavior, welfare, and evolution.

Scientific Impact

SINCE 2020:

5 multi-institutional animal welfare science projects

90+ Research Projects

25+ Species and Habitats Studied

SINCE 2015:

125+ Scientific Publications

Because Red Wolves are obligate carnivores, they need whole prey items containing meat, fat, and bone to stay healthy. These more natural diets help support their digestion, gastrointestinal health, and natural behaviors.

ADVANCING WELFARE THROUGH NUTRITION

At the Zoo, we link nutritional strategies to measurable health outcomes in managed species to promote welfare and conservation goals. Our research has shown that diet is more than just about nutrition, it's also a key driver of health and behavior. For example, our long-term study of Red Wolves found that those fed only kibble were four times more likely to develop serious digestive problems compared to wolves whose diets included carcasses, highlighting the importance of feeding practices that support both gut health and natural behaviors.

Similarly, a study of giraffes across 16 facilities revealed that daily browse (woody vegetation that mimics what they eat in the wild) was the strongest predictor of healthy hooves. Giraffes with more browse in their diet experienced fewer cases of lameness and spent more time engaged in natural foraging, reducing stress and supporting overall well-being.

Building on these insights, the Zoo is innovating in nutrition to drive better welfare across species. By designing diets and feeding programs that mirror natural behaviors, we are improving health outcomes, enriching daily experiences, and setting new standards for care in managed and endangered species.

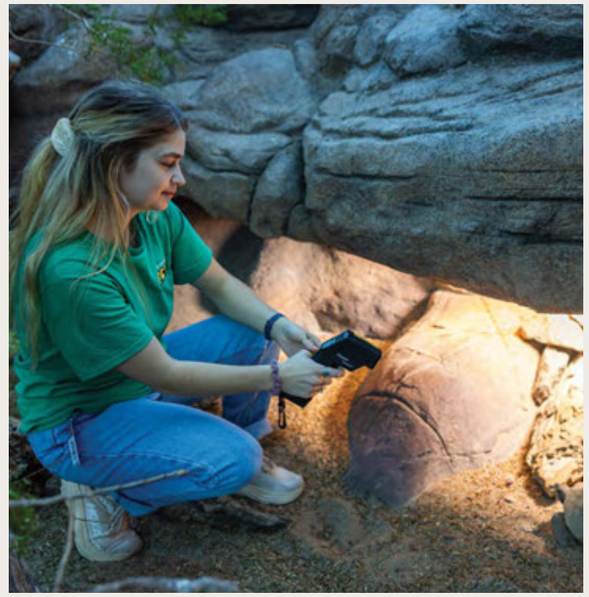
Feeding on browse encourages natural behaviors and supports the physical health and welfare of giraffes (*Giraffa camelopardalis*).

A juvenile female Komodo dragon (*Varanus komodoensis*) enjoying filtered natural light in her habitat at the Zoo.

ELEVATING CARE FOR OFTEN OVERLOOKED SPECIES

Reptiles are understudied, and ectotherms' subtle behavioral cues complicate care and welfare assessment. Despite their widespread presence in zoos and private collections, evidence-based guidelines for these species remain scarce. To address these gaps, the NC Zoo is leading comprehensive studies that combine research and innovation to improve reptile health, behavior, and overall welfare.

In one of the first multi-institutional studies exploring Komodo dragon (*Varanus komodoensis*) welfare, our research relied on data from 44 individual dragons across 20 US zoos and showed that natural light encourages more species-appropriate behaviors than artificial lighting, highlighting how targeted habitat design can improve both health and well-being.



A research intern uses a temperature gun to monitor environmental conditions in a reptile habitat.

The North Carolina Zoo carefully designs lighting systems to meet the species-specific needs of managed animals.

In parallel, a controlled study of 12 juvenile Eastern indigo snakes found that UV lighting increased activity and growth. These thoughtfully enriched environments supported calmer, more natural behaviors compared to constantly changing enrichment.

The Zoo is driving innovation in reptile care by designing lighting, enrichment, and habitats informed by research. These approaches improve health, behavior, and overall welfare, setting new standards for underrepresented species in managed care.

Eastern indigo snakes (*Drymarchon couperi*) are classified as federally threatened and their survival is partially reliant upon reintroduction programs through releasing individuals from managed populations, highlighting the need to provide excellent care to zoo housed snakes.

Amphibian Conservation

PUERTO RICAN CRESTED TOAD

- 94 tadpoles produced from rescued cryopreserved gametes
- First successful release into natural habitat

GENETIC BANK

- Genetic material preserved from six amphibian species
- Stored for future conservation breeding efforts

Genetic material collected from amphibians is stored in a cryotank for future breeding efforts.

"As a researcher at the North Carolina Zoo, I have had an incredible opportunity to work with a widely diverse collection of amphibian species. We are not only striving to advance and implement the latest science to work in pursuit of saving species from extinction, but also educating the public about the remarkable amphibians that are found in their backyards."

— Shaina Lampert,
Amphibian & Reptile Research Associate

Shaina Lampert holds an eastern newt (*Notophthalmus viridescens*).

AMPHIBIAN REPRODUCTION

The North Carolina Zoo is making significant strides in amphibian conservation using Assisted Reproductive Technologies (ART) and headstarting. We successfully produced 94 Puerto Rican crested toad tadpoles from salvaged gametes—the first time this method has been completed successfully for this species. These offspring were released into the wild to strengthen native populations. Additionally, we cryo-preserved genetic material from 36 individuals across six amphibian species, safeguarding valuable genetic diversity.

Furthering our understanding of amphibian reproduction, we assessed the breeding traits of Yonahlossee salamanders and used ultrasonography to guide breeding decisions for four amphibian species.

The Yonahlossee salamander (*Plethodon yonahlossee*) is a southern Appalachian endemic whose populations are best maintained in large tracts of mature deciduous forest.

SUSTAINABILITY AND GREEN PRACTICES

In 2022, the World Association of Zoos and Aquariums honored the North Carolina Zoo with the top sustainability award, recognizing it as a global leader in environmental sustainability. For nearly 40 years, the Zoo has been committed to protecting our air, water, land, and wildlife. In addition to reducing waste, conserving energy and water, generating renewable energy, and supporting electric vehicles, the Zoo also encourages guests to take action and make changes in their own lives to benefit the environment.

SUSTAINABLE SOLUTIONS

FROM WASTE REDUCTION TO RENEWABLE ENERGY, THE ZOO LEADS THE WAY IN ENVIRONMENTAL STEWARDSHIP AND GREEN INNOVATION.

ECO-EFFICIENCY PROGRAMS

WASTE REDUCTION & REDUCING SINGLE-USE PLASTICS

The Zoo's most extensive sustainability efforts focus on reducing waste, reusing materials, and expanding recycling and composting programs. A key initiative is the Zoo's commitment to phasing out single-use plastics across its operations. Cutting back on plastic use reduces fossil fuel consumption, prevents marine debris, and addresses concerns about microplastic pollution. The Zoo also targets high-volume waste streams, such as recycling disposable gloves used in large quantities. Cell phone recycling is another important effort—helping to reduce demand for minerals mined in central Africa, where gorilla habitats and other wildlife are under threat.

Each year, the Zoo composts over 2,000 tons of organic waste, including animal manure, plant trimmings, and food scraps from its restaurants. Even the plates, cups, and utensils used on site are made from plant-based, compostable materials. All compost produced stays at the Zoo to support horticultural operations.

The Zoo has implemented numerous projects to conserve energy and water, and generate renewable energy, and support electric vehicles. The Zoo has installed high-efficiency LED lighting that uses 64% less energy, improved HVAC control systems, and closely monitors electric and water meters to quickly identify and address system issues or leaks. To reduce water consumption, the Zoo uses xeriscaping with native, drought-tolerant plants and draws irrigation water from on-site lakes rather than municipal sources.

At the Zoo's Solar Pointe, three picnic shelters feature 9,600 square feet of photovoltaic panels that generate 104 kilowatts per hour—enough to power 12 homes for a year. The Zoo has also shifted 25% of its vehicle fleet to fully electric, including buses and a tractor, and offers 14 electric vehicle charging stations free to guests and staff.

William Coley, when he's not juggling popcorn, and the rest of the SSA team manage the Zoo's food service operations in alignment with the Zoo's sustainability mission.

"In our efforts of making the North Carolina Zoo's mission our own, we source and offer compostable food packaging. Our snack cups are made with 100% corn oil, plates, bowls, and cutlery from plant fibers, and even popcorn bags are made from wood fibers."

— William Coley,
SSA Group, Assistant General Manager

"Our sustainability practices have made a difference to the Zoo and the Earth and set an example for our guests for over 20 years."

— Bob Langston
Sustainability & Conservation Outreach Coordinator

Bob has been a long-term advocate for environmental sustainability and has been central to advancing the Zoo's sustainability initiatives.

Solar Pointe on-site at the Zoo generates enough renewable energy to power 12 residential homes in a year.

LEFT: The Zoo currently offers 14 electric vehicle charging stations.

RIGHT: The Zoo maintains a growing fleet of electric vehicles, including cars, trucks, buses, and even tractors.

Zoo Sustainability Highlights

COMPOSTING & RECYCLING

- 2,000+ tons composted yearly
- No single-use plastics
- Compostable dishware used Zoo-wide
- Cell phone & glove recycling programs

ENERGY & EFFICIENCY

Reducing waste and emissions through smarter systems.

64%

LED LIGHTING CUTS ENERGY USE BY 64%

25%

25% OF ZOO FLEET VEHICLES ARE ELECTRIC

CONSERVATION PARTNERS

The North Carolina Zoo partners with a broad network of organizations across the globe to drive meaningful conservation action. Through collaboration with local communities, scientific institutions, and leading conservation groups, we help safeguard wildlife, restore critical habitats, and advance conservation science worldwide.

GLOBAL PARTNERSHIPS

THE ZOO WORKS WITH 90+ PARTNERS ACROSS 20+ COUNTRIES, DRIVING CONSERVATION ACTION THROUGH COLLABORATION AND EXPERTISE.

Global Reach

THE ZOO LEADS GLOBAL EFFORTS TO CONSERVE WILDLIFE.

GLOBAL NETWORK

90+ Active Partners

20+ Countries

→ Partnering to Protect Species & Habitats

→ Conserving Nature Across Continents

CONSERVATION PARTNERS

African Parks
American Association of Zoo Keepers
Association of Zoos & Aquariums
Bauchi State Government, Nigeria
BioCarbon Partners
Bioko Biodiversity Protection Program
BirdLife International
BirdWatch Zambia
Carolina Climbers Coalition
Caring for Conservation
Catawba College
Chimpanzee Sanctuary and Wildlife Conservation Trust & Ngamba Island Chimpanzee Sanctuary
Cleveland Metroparks Zoo
Commonwealth of Northern Mariana Islands Division of Fish & Wildlife
Conservation Lower Zambezi
Conservation South Luangwa
Cross River State Forestry Commission, Nigeria
Dian Fossey Gorilla Fund
Duke University
Elephant Without Borders
Emory University
Endangered Wildlife Trust
Fort Wayne Zoo
Frankfurt Zoological Society
Friedkin Conservation Fund
Game Rangers International
Greater Uwharrie Conservation Partnership
Grumeti Fund
High Point University
International Union for Conservation of Nature
Ivorian Office of Parks and Reserves, Ivory Coast
Kamwenge District Local Government, Uganda
Kenya Birds of Prey Trust
Kibale Association for Rural and Environmental Development
Kibale Chimpanzee Project
Ministry of Environment, Forestry and Tourism, Namibia
Ministry of Forestry and Wildlife, Cameroon
Ministry of Water and Forests, Ivory Coast
Minnesota Zoo
Mohamed bin Zayed Species Conservation Fund
Namibia Nature Foundation
National Administration for the Conservation Areas
National Geographic Society
National University of Equatorial Guinea
Nature Tanzania
Ngogo Chimpanzee Project
Nigeria National Parks Service
North Carolina Department of Transportation
North Carolina Forest Service
North Carolina Land and Water Fund
North Carolina Museum of Natural Sciences
North Carolina Natural Heritage Program
North Carolina State Parks
North Carolina State University
North Carolina State University College of Veterinary Medicine
North Carolina Wildlife Resources Commission
Nunavut Wildlife Management Board
Pacific Bird Conservation
Painted Dog Conservation
Panthera
Para la Naturaleza
Peace Parks Foundation
Piedmont Land Conservancy
Puerto Rican Crested Toad Conservancy
Puerto Rico Department of Natural Resources
Qikitani Inuit Association
Re:Wild
Red Colobus Conservation Network
Ruaha Carnivore Project
Save the Rhino Trust
Sebitoli Chimpanzee Project
Sedgwick County Zoo
SMART Partnership
Southern Tanzania Elephant Project
St. Louis Zoo
Tanzania National Parks
Tanzania Wildlife Authority
Tanzania Wildlife Research Institute
The Nature Conservancy
The Peregrine Fund
Three Rivers Land Trust
U.S. Fish & Wildlife Service
U.S. Forest Service
U.S. Virgin Islands Division of Fish and Wildlife
Uganda Wildlife Authority
University of Calgary
University of Glasgow
University of St Andrews
Victoria Falls Wildlife Trust
VulPro
West African Primate Conservation Action (WAPCA)
Wilder Institute/Calgary Zoo
Wildlife Conservation Society
Wildlife Protection Solutions
Wildlife Trafficking Alliance
World Wildlife Fund
Zambia Carnivore Program
Zambia Department of Parks and Wildlife
Zimbabwe Parks and Wildlife Management Authority
Zoological Society of London

Participants from 17 different countries at an Advanced SMART training organized by the Zoo's conservation staff in Rwanda. These types of globally diverse educational opportunities are a major part of our efforts with SMART.

North Carolina ZOO AND BOTANICAL GARDENS

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Saving a Piece of the World for its Wildlife
NC Zoo Society

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