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Newsletter

2023  
Volume 1



As we kick off our first full year of 2116 Advisors, we're honored to have you by our side. Through our shared commitment, our impact is magnified—and together, we can secure the future for wildlife, people, and the planet we share. I hope you enjoy this second edition of the 2116 Advisors newsletter—a digest of the latest news, updates, and happenings at San Diego Zoo Wildlife Alliance that has been curated exclusively for you. We are so grateful for you, and all you make possible here in San Diego, and in communities and ecosystems across the globe. Thank you for all you do. I look forward to all we can accomplish through this special advisory group, in 2023 and beyond.

Together for wildlife,

**Paul A. Baribault**  
President and Chief Executive Officer  
San Diego Zoo Wildlife Alliance



SAN DIEGO ZOO WILDLIFE ALLIANCE

21  
16

TWENTY-ONE SIXTEEN ADVISORS



**The World Is**

**in Your Hands**

This curated selection of updates and stories is exclusively for you, our San Diego Zoo Wildlife Alliance (SDZWA) 2116 Advisors. On the following page, you'll discover a functional Table of Contents. To read more about a topic that piques your interest, simply click the link and you'll be taken directly to that story within the newsletter. If you prefer to browse,

skip straight to page 5 to discover the latest from the San Diego Zoo, the San Diego Zoo Safari Park, and collaborative conservation projects worldwide. Thank you for being part of this important group, and for all you make possible. We're here for you—today and always. Please reach out to us at any time. We look forward to hearing from you. 📧

**At the Zoo**  
Breeding introductions begin for critically endangered Amur leopards

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Kurt and Holly bring hope for the future of Przewalski's horses

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Click the title to view the story

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Click the title to view the story

# MEDIA REACH & HIGHLIGHTS IN THE NEWS

In 2022, we garnered **617 million** views across social media and **97 billion** views in earned media, representing nearly **\$200 million** in media value.

## Here are some of our latest highlights:

### SAN DIEGO ZOO WILDLIFE ALLIANCE JOURNAL



January/  
February 2023

This issue focuses on our Southwest Conservation Hub, including endangered mountain yellow-legged frogs, California condors, and other local species.

**NBC** ▶ Saving the California Condor

**TODAY SHOW** ▶ Penguin Given Life-saving Booties

**NATIONAL GEOGRAPHIC EN ESPAÑOL**  
The story of 'Lucas', the African penguin who will be able to walk again with the help of the San Diego Zoo

**CNN**  
San Diego Zoo welcomes birth of adorable white rhino calf

**LA TIMES**  
White rhino calf born at San Diego Zoo Safari Park

**NPR**  
After years of waiting, rare turtles have bred 41 hatchlings at the San Diego Zoo

**NY TIMES**  
With Fall Migration, Bird Flu Flies Back Into Town

**INDEPENDENT**  
Global warming forcing monkeys and lemurs to climb down trees, study finds

**USA TODAY**  
Monkey see, monkey go: How climate change, deforestation are putting some primates in a bind

**PEOPLE**  
9-Year-Old San Diego Zoo Mouse Named Oldest Mouse in Human Care by Guinness World Records

# ACROSS THE ALLIANCE

## Our Values

*Collaborate, Innovate, Inspire, Thrive*

## Collaborate



### WORLD ASSOCIATION OF ZOOS AND AQUARIUMS

After two years of virtual meetings, team members and executive leaders attended the 77th Annual World Association of Zoos and Aquariums (WAZA) Conference in Tenerife, Spain. Hosted by Loro Parque, it focused on themes of welfare, population sustainability, conservation, and strategic planning. Oliver Ryder, Ph.D., director of Conservation Genetics, was featured as a speaker and provided an in-depth look into the International Union for Conservation of Nature (IUCN) Animal Conservation Bio Banking Specialist Group, of which he is also founding co-chair.

As we prepare to host the 78th WAZA conference in San Diego in October of this year, the executive team was able to further develop new and existing partnerships, visiting several leading zoological institutions while they were in Europe. They met leadership and toured facilities at Pairi Daiza Zoo (Brussels, Belgium), Berlin Zoological Garden (Berlin, Germany), Leipzig Zoo (Leipzig, Germany), and Zurich Zoo (Zurich, Switzerland). These international partnerships are vital to our global conservation work, and we look forward to one day welcoming each of the European teams to the Zoo and Safari Park.



*Gorillas at the Safari Park*

### CONFERENCE PARTICIPATION

Teams recently contributed to two important annual conferences, for the American Association of Zoo Veterinarians (AAZV) and our accrediting institution, the Association of Zoos and Aquariums (AZA). Teams held talks and workshops on subjects ranging from fungal infection in pond turtles to the use of alternate wildlife healthcare treatments, including physical therapy and acupuncture. And, they shared information on elephant health, wildlife ambassador

programs, and habitat design. These meetings are great opportunities to form connections and continue to lead critical conversations about wildlife health, care, education, and conservation.

### SHARING PANDEMIC LESSONS

At the annual convention of the American Veterinary Medical Association, we contributed to a scientific session on coronavirus, allowing us to share the lessons we learned about wildlife health

and care during the pandemic, specifically about gorilla infections and our strategic vaccination program. Speakers discussed the impact of COVID on wildlife in our care, how to test, prevent, and treat infections, and the public health implications of managing zoonotic diseases. This collaborative effort and sharing of scientific information is crucial to a world where all life thrives.

### Government and Community Relations

#### **PARTNERING FOR WILDLIFE**

For decades, we have collaborated with the U.S. Fish and Wildlife Service (USFWS) on various wildlife projects. Recently, our Government Affairs team organized a tour at the Zoo for their board of directors. **The 30 USFWS leaders spent the day engaging with our collaborative conservation projects**, with visits to the butterfly conservation lab, California condor habitat, and Denny Sanford Wildlife Explorers Basecamp, where they learned about our collaborative burrowing owl conservation efforts and our collective efforts to combat the illegal wildlife trade.

#### **HAPPENING**

- At the Zoo
- At the Safari Park
- Worldwide



*Flamingos in a covered habitat at the Zoo*

#### **SHARING OUR CONSERVATION WORK**

Representatives from the offices of Senator Pro Tem Toni Atkins, and California State Assembly members Chris Ward and Tasha Boerner-Horvath, attended an educational tour of the Safari Park's Beckman Center for Conservation Science to learn about local conservation initiatives. They visited the molecular lab, Wildlife Biodiversity Bank, tech lab, conservation education lab, and mountain yellow-legged frog lab. **These tours are a great way to share our conservation effort that begins at our two front doors and reaches beyond into our conservation hubs.**

#### **HPAI**

We continue to closely monitor highly pathogenic avian influenza (HPAI). To protect birds in outdoor habitats at the Zoo and Safari Park, including flamingos and penguins, they were moved to protected, covered areas, and/or protective coverings have been installed over these temporary habitats to keep them safe and healthy. **Birds are adjusting well, and signs are in many habitats offering an explanation to guests. Flamingos have greeted visitors to the San Diego Zoo since 1932. Currently, flamingo statues are greeting visitors instead!**

### Philanthropy and Events

#### **FOOD, WINE & BREW CELEBRATION**

At this one-of-a-kind annual tasting event in September, Southern California's best food, wine, and beer are mixed with live entertainment, wildlife encounters, and dancing—all enjoyed at the Zoo. With over 130 participating vendors, the sellout event saw 3,000 guests enjoying themselves on this tasty evening as they supported our critical conservation work.



*Food, Wine & Brew Celebration*



*HalGLOWween*



*Jungle Bells*



*Autumn Festival and Wild Holidays*

#### **ANOTHER SUCCESSFUL KIDS FREE OCTOBER**

Kids Free October makes the Zoo and Safari Park accessible to kids who otherwise may not have the opportunity. Every October, kids ages 11 years and younger receive free admission all month long—no ticket is required. Since the program's start, over 1 million children have visited the Zoo and Safari Park at no cost to them.

#### **FALL AND WINTER FESTIVITIES**

With HalGLOWween and Jungle Bells at the Zoo, and Autumn Festival and Wild Holidays at the Safari Park, our fall and winter celebrations were a resounding success. Visitors enjoyed seeing our parks in new ways through the lens of festive fun—including incredible light shows, special entertainment, seasonal food, and even snow!



Denny Sanford joins the executive team at Elephant Valley

**DENNY SANFORD THANK-YOU DINNER**

On a beautiful evening, complete with a rainbow over the savanna, we celebrated Denny Sanford and his generous naming gift for the all-new Denny Sanford Elephant Valley, which will propel the Safari Park into its next 50 years of conservation and life-changing moments. Construction began on Elephant Valley late last year.

**PHILANTHROPY PROGRAMS**

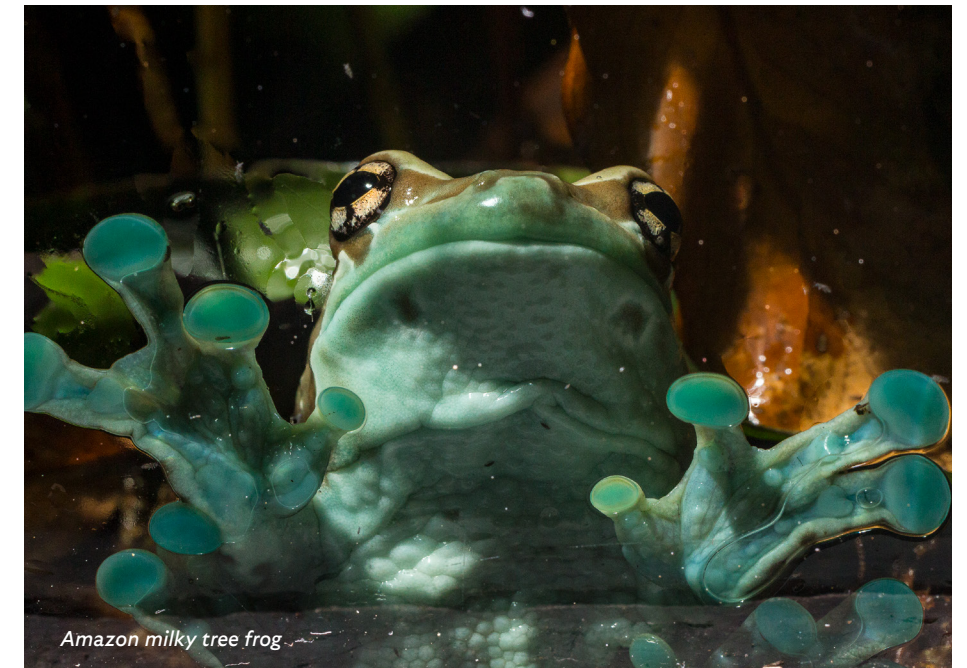
Our special donor groups—Aardvarks, GAZELs, Ocelots, and President’s

Clubs—have enjoyed a range of programming in recent months, including lunch and dinner events, fascinating presentations from wildlife care specialists, and updates from the executive team. Hearing from Kim Gray about Fijian iguanas and Lisa Peterson on Tembo Trail at Denny Sanford Elephant Valley, getting a behind-the-scenes peek into the Nikita Kahn Rhino Rescue Center from lead wildlife care specialist Jonnie Capiro—and so much more—these donors get an inside look at Alliance happenings. 📍

# Innovate

**SEED COLLECTION EXPEDITION**

Members of our Plant Conservation team participated in a monitoring and seed collection expedition to the Modoc Plateau, a region in the far northeastern corner of California that’s underrepresented in conservation seed collections. During the expedition, our teams and partners searched for over 20 plant species. The trip was very successful, collecting seeds from 5 rare plant species and scouting over 30 rare plant populations, including relocated historical populations. Additional future trips to the region will help us get more of these plants into long-term conservation collections.



Amazon milky tree frog

**UNIQUE CELLS BANKED**

Our team recently added viable cell lines from several new species to the Frozen Zoo®, contributing to what was already the largest repository of its kind in the world. As part of our Wildlife Biodiversity Bank, the Frozen Zoo houses more than 10,600 cryopreserved cell lines of more than 1,200 species and subspecies, including some that are extinct. New additions

include three amphibians—the Amazon milky tree frog, magnificent tree frog, and dyeing poison frog—and three marine mammals—the Florida manatee, Baird’s beaked whale, and short-finned pilot whale. These unique cells will be used for in-house conservation research, and can also be provided to qualified researchers globally as an invaluable resource for wildlife conservation. 📍



Cryopreserved biological materials are stored in the Frozen Zoo

# Inspire



Rose Parade float

### 134TH ROSE PARADE

We rang in the New Year with tens of millions of viewers! Our award-winning float in the 134th Rose Parade® celebrated 50 years of life-changing moments, innovation, and conservation impact at the San Diego Zoo Safari Park. Winning the Animation Award,

it brought to life the Safari Park's iconic Wildlife Safari experience, and its ability to connect guests with wildlife and awe-inspiring conservation stories. Joining the Safari Park's Executive Director Lisa Peterson on the float were wildlife care specialists, expert wildlife guides, veterinarians, and conservation

scientists who have dedicated their lives to caring for wildlife in San Diego and around the globe. Our participation in the parade brought global attention to the incredible conservation impact the Safari Park makes possible, creating even more allies for wildlife around the globe.

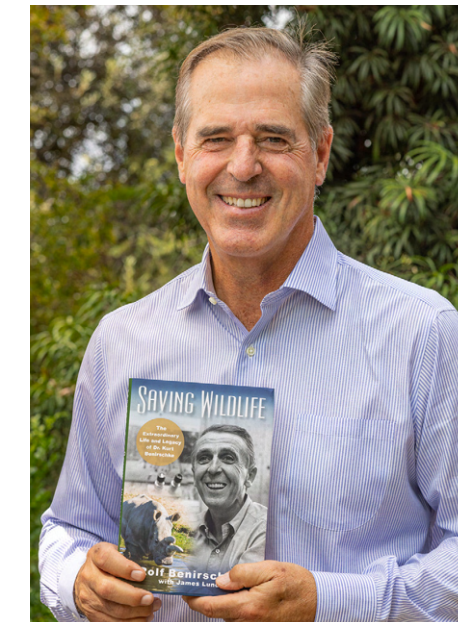
### PUBLISHING NEWS

Our award-winning San Diego Zoo Wildlife Alliance Press debuted several exciting publications this fall. New releases include a range of inspiring children's stories on wildlife and conservation, and a memoir about the extraordinary life and legacy of conservation pioneer,

Dr. Kurt Benirschke. Written by his son, San Diego Zoo Wildlife Alliance Trustee Rolf Benirschke, the book captures "Dr. B's" incredible contributions to our organization—and the world-changing role he played in establishing the wildlife conservation movement as we know it today. Rolf spoke about the new book at a sold-out event at Warwick's independent bookstore in San Diego.

### EXPANDING OPPORTUNITIES IN WILDLIFE HEALTH

Our Wildlife Health team received a federal grant from the Institute of Museum and Library Services (IMLS) to support mentorship for veterinary students and recent graduates. Through our mentorship program, 34 mentees will receive travel, lodging, research, and publication support over a 3-year period. To the best of our knowledge, we are the only zoo with a program of this kind. Providing these stipends allows us to be more inclusive in our recruitment and acceptance into this program, ultimately supporting a more diverse applicant pool and contributing to our diversity, equity, and inclusion (DEI) goals.



Rolf Benirschke with his new book, *Saving Wildlife*

### CARE FOR TRAFFICKED PLANTS

The Safari Park, in collaboration with the U.S. Fish and Wildlife Service's Plant Rescue Center Program, received a half ton of illegally trafficked cactus and succulents. Our Horticulture department began taking inventory and has identified more than ten varieties of cactus and succulents with a geographical range covering three continents. These plants will ultimately be planted in the Safari Park and Zoo botanical gardens and landscapes.



Confiscated plants

## Education

### SEVENTEEN YEARS OF CONSERVATION EDUCATION

Teacher Workshops in Conservation Science completed its 17th year in 2022. Over 5 weeks, we had 148 middle and high school teachers join us from 21 states, the District of Columbia, and 3 countries, impacting 24,420 students.



Students learn about conservation science

### CONSERVATION LEARNING

Our Conservation Science Experiential Learning team was excited to kick off another school year with in-person learning for students at the Beckman Center. In the lab, students participate in hands-on activities that emulate the work being done by our conservation scientists. The communities and schools that our team serves are located throughout Southern California. After opening the reservation system, it only took about 24 hours before our calendar was filled with appointments.

#### HAPPENING

- At the Zoo
- At the Safari Park
- Worldwide

Through the end of 2022, we had over 3,200 students and their teachers join us for lab sessions.

### TOMORROW'S CONSERVATION SCIENTISTS

The Conservation Science Summer Fellowship program had another successful year hosting undergraduate science students from around the country. Representing a range of disciplines, the students experience applied conservation science and the extraordinary mentorship of our teams. Additionally, during the 2022 summer season, we were able to welcome all 14 of our summer fellows at the Beckman Center for in-person scientific training and research with

our field-based and lab-based teams. This innovative program has been generously endowed by the Arnold and Mabel Beckman Foundation, the JW Sefton Foundation, Jewell and James Bonner, and more.

### EXPLORER ADVENTURES

The Education department is piloting a new program at Wildlife Explorers Basecamp called Early Morning Explorers. On select Saturdays, families can enjoy unique adventures together before the Zoo opens for the day, including exclusive wildlife viewing opportunities and hands-on nature exploration projects, such as planting milkweed, nature journaling, or building a pollinator hotel. 🌱

# Thrive



Kurt and Holly at the Safari Park

## New Arrivals and Wildlife Updates

### A CLONE AND HIS MENTOR

Przewalski's horses Kurt and Holly are thriving in their new habitat at the Safari Park. Their pairing is a step in a long process to bring back lost genetic diversity to this endangered species. Formerly extinct in the wild, all living Przewalski's horses were descended from just 12 individuals—until Kurt was born in 2020. He's the clone of a male Przewalski's stallion whose DNA was cryopreserved 42 years ago in our Wildlife Biodiversity Bank, and which had been absent from the living population. Once he reaches maturity at the age of 3 to 4 years, the plan is for Kurt to be the breeder stallion of the herd—thus bringing back vital, previously-lost genetic diversity and helping secure the future for this majestic species.



**HAPPENING**

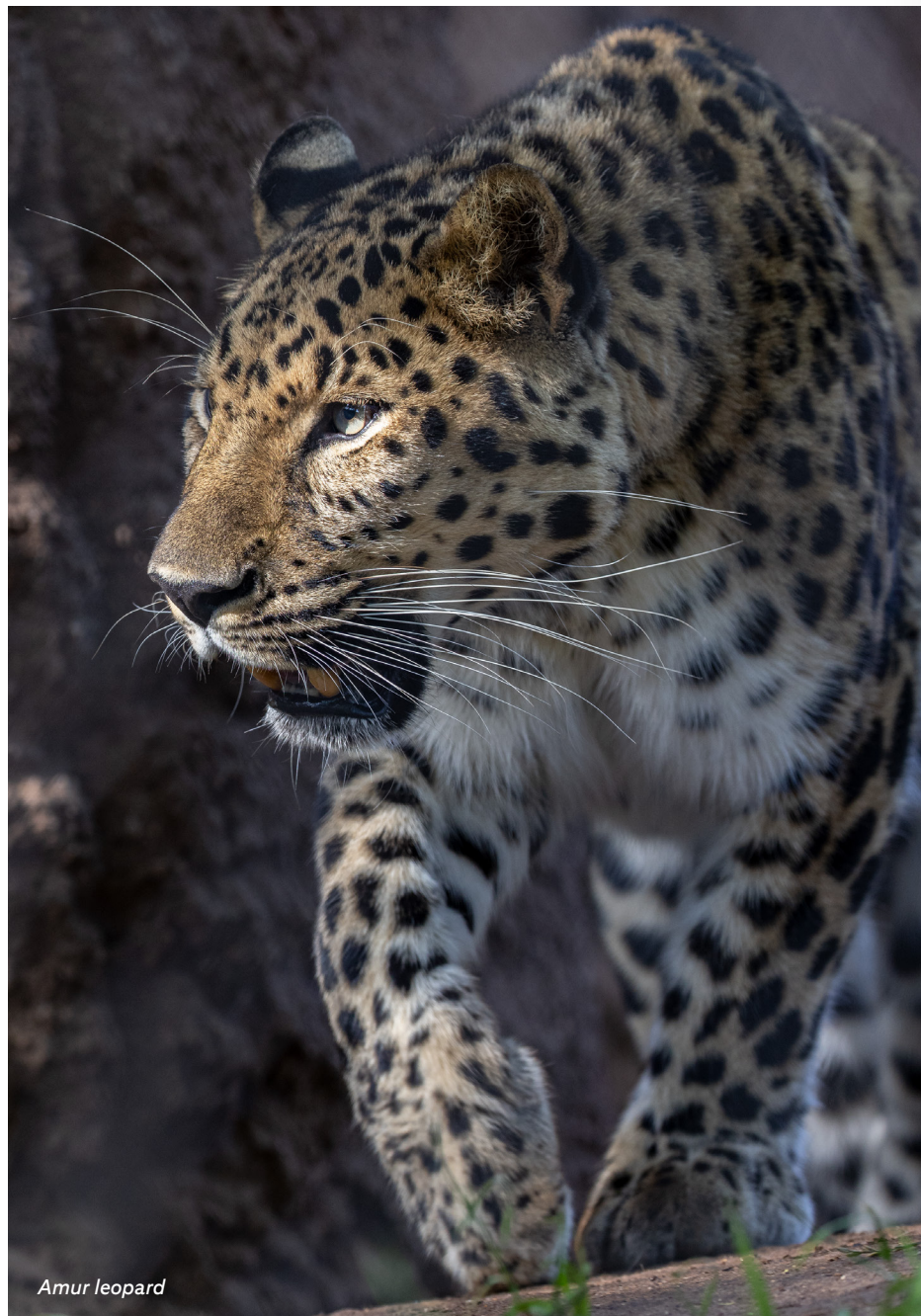
- At the Zoo
- At the Safari Park
- Worldwide

**HARTMANN'S ZEBRAS ARE BACK**

Three female Hartmann's mountain zebras have arrived at the Safari Park—the first in our care in almost a decade. Hartmann's zebras, like other zebra subspecies, are threatened with extinction, and the knowledge gained from caring for them is invaluable in protecting wild populations.

**FIRST MANY-COLORED FRUIT-DOVE CHICK**

For the first time, a many-colored fruit-dove hatched at the Zoo—it's only the second hatching for any Association of Zoos and Aquariums (AZA) accredited institution. These brightly colored birds are native to Pacific Islands. While they are not yet listed as threatened by the IUCN, declining populations and a restricted range are causing concern, and each chick hatched is important to the future of the species.



*Amur leopard*

**FEWER THAN 100**

Breeding introductions began for two pairs of Amur leopards at the Zoo, as recommended by the Species Survival Plan (SSP). There are fewer than 100 of these big cats estimated to be left in their native habitats across eastern

Russia and China, and these pairings are crucial in securing the future for this critically endangered species. We're working with partners around the world to secure a sustainable and genetically diverse population of Amur leopards, and cubs were born at the Zoo in 2018 and 2020.

**HATCHING CRITICALLY ENDANGERED TURTLES**

After more than two decades of caring for these endangered turtles, we're thrilled to welcome Indian narrow-headed softshell turtle hatchlings—a first for the Zoo, and for all AZA-accredited conservation organizations in North America. The 41 hatchlings are vital additions to the global population, and represent an enormous step forward in our work to save the species.



*Indian narrow-headed softshell turtle*

Two endangered thick-billed parrot chicks fledged at the Bird Conservation Center. We're working to save the species through our Southwest Conservation Hub.



*Thick-billed parrots*

A male kudu was born in September, and the African antelope's long, spiral horns will start growing in anytime now.

An African pygmy falcon—the continent's smallest bird of prey—hatched at the Safari Park for the first time since 2005. The chick is being raised by its parents at the Bird Conservation Center.

Six critically endangered dama gazelles were born at the Safari Park. With less than 200 estimated to be left in their native savanna habitat, each new calf is vital and brings hope for the future of the species.

The grizzly bears at the Zoo, Scout and Montana, received a special snow day. The snow was part of a multi-day enriched experience, promoting behaviors such as foraging, grooming, play, and thermoregulation.



*Scout and Montana*

Five springbok calves were born to the herd at the Safari Park's South Africa habitat.

A male giraffe calf was born to the growing herd that roams the plains of the Safari Park's East Africa habitat. Named Upendi, which means "love" in Swahili, the calf is fitting in very well with the rest of his family.



*Giraffe calf*



# African Forest Conservation Hub

## Working Together

Conservation begins with people and communities, and is vital to our work in Cameroon’s Ebo forest. In partnership with the Ebo Traditional Chief’s Association, our African

Forest team organized a crucial meeting in Cameroon to discuss the future of the Ebo forest landscape. **This consultative stakeholders’ meeting brought together nearly 200 people representing more than 40 villages from the 9 clans around the**

### HAPPENING

- At the Zoo
- At the Safari Park
- Worldwide

forest. Other participants included representatives from government ministries, local councils, nonprofits, and prospective donors. The goal was to secure the commitment of all relevant stakeholders for an inclusive and transparent land use planning

process, and brainstorm approaches for sustainable development. **The meeting led to creation of an action plan, proposing actions such as infrastructure improvement, diversification of professional training, and natural resource and biodiversity protection.**

**Innovative Partnerships**  
After the meeting, Antoine Marchal, scoping officer for our partner Rainforest Trust, made a field visit to parts of Ebo with our research assistant and partners. He was able to get important drone footage of the forest and meet with members of the newly formed, community-led Chimpanzee Guardian Club. **Together with our partners, we are working on a major proposal to Rainforest Trust for work that will determine the future land tenure and management regime of the Ebo forest.**

**Community Engagement**  
We’ve helped establish an environmental education center adjacent to Cameroon’s Mbam Djerem National Park, designed to bring biodiversity conservation closer to school children and the community. Since its inception in 2021, hundreds of children have visited to learn about the history, animals, and plants of the area. They also engage in environmental improvement activities, such as collecting plastic waste. **Education and community engagement opportunities are critical in achieving sustainable conservation.** 🌱



*Technology, including motion-activated trail cameras, is an important conservation tool*

*Breathtaking views of Ebo forest*



# Amazonia Conservation Hub



A bend in the Amazon River

### Wildlife Shelter Partnerships

Our teams have worked together with Peruvian veterinarians and conservation specialists to find a feasible medical management plan for a short-eared dog and red brocket deer in wildlife shelters. These collaborations with Amazon Shelter and Taricaya Eco Reserve have been supported by our participation in the In Situ Labs initiative—a movement focused on empowering local scientists and community leaders with tools to monitor wildlife and

wildlife health. This work is inspiring the development of a formal path forward for our experts to support our in-country partners on veterinary medicine needs.



Los Amigos Biological Station

### Sampling Success

In what was one of the most successful years of our partnership, our partner Field Projects International hosted over 30 students, 10 veterinarians, and specialists in birds, reptiles and amphibians, small- and medium-sized mammals, and conservation technology in the Peruvian Amazon. With the support of the Wildlife Conservation Laboratory at Los Amigos Biological Station, we sampled over 715 individual animals for biodiversity metrics, disease



surveillance, mercury testing, and health screens. We also successfully placed collars on several species



In situ laboratories have a big conservation impact

of primates, tayra, and ocelot for a comparative study of animal movement tracking technology. This knowledge helps inform conservation efforts.

### Caught on Camera

Between 2017 and 2021, we collected 300,000 images from our trail cameras along the elevational gradient of Peru's Manu Biosphere Reserve. These images reveal more than 100 species of birds and mammals living between the Andean grasslands and the Amazon rainforest. This vital data



Andean fox

helps scientists understand where species live in this gradient, explore interactions among wildlife species and human activities, and evaluate seasonal changes in wildlife behavior and space use. Additionally, these images will be used to develop new artificial intelligence models to facilitate faster translation of images to information.

### Monkey ID

The Madre de Dios region in Peru is home to two howler monkey species that look similar, but are genetically different. Genetic species identification aids rehabilitation and release efforts by our partner, Amazon Shelter, and has been happening with help of partner scientists at the Wildlife Conservation Laboratory. The team confirmed the species identity of rehabilitated monkeys in the care of the shelter, thus gaining governmental permission to release 10 howler monkeys in 3 groups this fall. 🐒



## Asian Rainforest Conservation Hub



Hornbills

### Nest for Success

Our partners at Gaia completed installation of two artificial nest barrels for hornbill pairs in Batu Rakit, Malaysia. Hornbills nest in the cavities of tall trees (some nests can be as high up as 230 feet), but deforestation, and especially the loss of trees suitable for nesting, threatens the ability of these birds to breed successfully. To mimic trees' natural cavities, the artificial nest barrels are suspended high in the forest canopy. We sponsored these nest barrels, and we also participate in the conservation of several hornbill species through our conservation breeding programs in San Diego.

### Reducing Demand

We're working with a local Vietnamese firm on a marketing campaign to reduce demand for bear bile, a widely consumed wildlife product in a particular area of Vietnam. The campaign will be implemented this spring, including posters and messages broadcast to the village from village-level speakers. Together with our partners, we'll conduct pre-campaign and post-implementation surveys to assess the effect of the campaign on reducing consumption of bear bile in our target area.



Artificial nest boxes are raised into trees in Malaysia

CT machines are part of our comprehensive Conservation Science and Wildlife Health initiatives

### Rhino CT Scan

Our Wildlife Health team lent a hand to ZooParc de Beauval (France), sharing a rhino skull CT scan as the team prepared for tooth extraction in an Indian rhino. The CT helped them measure depth of the tooth roots, ensuring their team had the proper equipment for the surgery. Scans of rhino skulls are rare, due to the logistical difficulty of CT scanning a living rhino. However, when the Safari Park's Indian rhino, Bhramputra, passed away earlier this year, our team was able to collect a skull CT scan, preserving his legacy through his contributions to our understanding of wildlife health, and thus aiding rhinos around the world. This is but one example of the importance in our collection of CT images, which we regularly share with collaborators worldwide.



Sumatran tiger

### Tech Support for Human-tiger Coexistence

Our field team spent three days testing the performance of a GPS collar in the dense forest of West Sumatra, Indonesia to ensure it would work well when fitted to a rehabilitated tiger before reintroduction. We've donated five GPS collars to West Sumatra's Natural Resources Conservation Agency to track tigers that need to be translocated due to conflicts with local communities. Our conservation technology support is pivotal for effective human-tiger conflict mitigation strategies implemented by the Indonesia Ministry of Environment and Forestry. 🐅



## Australian Forest Conservation Hub



*Technology is a crucial conservation tool, and apps like Wildlife Near Me are helping in innovative ways*

### Help Wildlife Near Me

In times of crisis, the general public often looks to conservationists to find out how they can help. Our Australian partners at Science for Wildlife have created an app, called Help Wildlife Near Me, to help the public stay up-to-date and answer questions about how they can get involved in conservation. It uniquely focuses on the Blue Mountains region in Australia that was hit by megafires in 2019–2022. The app supplies much-needed, evidence-based information to local people about the ecosystems and wildlife they encounter, and what they can do to support habitat restoration and regional conservation.

### Assessing St. Bees Koalas

For over 20 years, our partner, Bill Ellis, Ph.D., and his team have been studying a secluded population of koalas on St. Bees Island, Queensland. Dr. Ellis and his team recently assessed the current state of this koala population and the condition of the forests on their island habitat, to see how they are both faring under current climate threats including drought and fire. The team was able to conduct some of the work using drones, which they one day hope to deploy as the main method of tracking for this population.

### Koala and joey

*Photo by: Vic and Lacey, Ian Brown koala release, LowerMountainsScat*

### Protections for Australian Plants

We supported our partners in securing the future for Australia's plants. Under the Environmental Protection and Biodiversity Conservation Act, fires are now recognized as a threat. This opens the door for national action, and brings much-needed attention to the issue to hopefully spur more action to address fire as a threat to biodiversity. We also supported partners in surveying plant species after the catastrophic fires of 2019/2020. The surveys identified several population declines, and as a result, our partners completed an IUCN Red List assessment and recommended that *Banksia pencillata* be listed as an endangered species in Australia. 🌿



## Southwest Conservation Hub



Desert tortoise hatchling

### Critically Endangered Desert Tortoise Hatchlings

We're working with partners to save critically endangered desert tortoises by giving hatchlings a headstart. Last year, teams collaborated to use a new digital x-ray system to radiograph tortoises in the field, to determine which were carrying

viable eggs. These females were then brought to a protected outdoor area to lay eggs before being returned to their home sites. However, when an extended heatwave threatened them, teams made the difficult decision to excavate nests and transport eggs and hatchlings to The Living Desert in Palm Desert, California, for indoor

rearing. The effort was a success, and all eggs hatched! **The 69 hatchlings are now thriving at The Living Desert, where they will spend their first year under our care, protected from predation during their most vulnerable age before being translocated to optimal sites in the wild and monitored closely.**

### By Leaps and Bounds

The mountain yellow-legged frog breeding program had overwhelming success last breeding season, with more than 4,000 eggs laid and over 50% fertilized, an increase from the previous 3 years. The team is working to onboard new facilities to headstart a larger number of frogs. And, they found tadpoles at a reintroduction site in the San Jacinto Mountains that had not been occupied by wild frogs since 2013!



Mountain  
yellow-legged frog

### One Tiny Mouse at a Time

It was a big breeding season for North America's smallest mouse. Our conservation breeding program for the endangered Pacific pocket mouse recorded the earliest breeding event and pup birth yet—and a record 31 litters, for a total of 117 pups. These endangered mice will be reintroduced into native habitats this spring. Only three small populations remain in native habitats, and our collaborative efforts are critical to the future of the species.



Pacific pocket  
mouse

*Prairie false oat*  
Photo by: Caroline "Ruby" Iacuniello/SDZWA  
and Dr. Joseph Ree/SDZWA



### "Lost" Plant Found

Our Native Plant Seed Bank team made the first-ever seed collection of prairie false oat, *Sphenopholis interrupta* ssp. *californica*. This species of native grass was presumed extinct until 2020, when two individual plants were rediscovered in northern San Diego County by local botanists. It was the first documentation of prairie false oat for over 100 years, and the first documentation of it in the United States. More plants were found in 2021, and with support from the San Diego Association of Governments, last year our team collected and banked seed from seven individuals, thus safeguarding this "lost" species for future generations, and preserving regional native botanical heritage.



# Southwest Conservation Hub

*continued*



*Western burrowing owl*

### HAPPENING

- At the Zoo
- At the Safari Park
- Worldwide



### Owl Resight

Western burrowing owls are endangered in San Diego County. As part of our collaborative, comprehensive effort to save them, we hatch and rear chicks at the Safari Park for reintroduction into local native habitat. And, we monitor the local populations to increase understanding of this intriguing species. Last season, we were surprised and delighted to photograph a female, known as “Red O,” at two locations 12 miles apart within a 24-hour period. Her journey seems like quite a feat for a tiny owl, and these observations clarify owl movements—an exciting step in our work to save the species, and a sign that the reintroduced populations are thriving.

*Teams prepare transitional habitats for reintroduced birds*

### Hope for California Oaks

Members of the Zoo’s horticulture team conducted a field work trip to Santa Cruz Island, where we work with endangered native oaks that grow only on the Channel Islands. California is home to more than 20 species of native oak trees, but across the country, oak populations are disappearing due to disease and habitat destruction. The acorns our team collected will be used to further our research into propagation and cryopreservation as we work to save southwestern oak species.

### Indigenous Peoples’ Celebration

We welcomed the San Pasqual Band of Mission Indians as they hosted the second annual Indigenous Peoples’ Celebration at the Safari Park. It was an honor to celebrate the historic commitments of the Kumeyaay people and Indigenous communities, who are the first stewards of the land and wildlife in our region. We are proud to deepen relationships with these communities.



*Indigenous Peoples’ Celebration*



# Savanna Conservation Hub



Neville, a southern white rhino calf born in our care

## HAPPENING

- At the Zoo
- At the Safari Park
- Worldwide

### Growing Family

Last year, the Safari Park's Nikita Kahn Rhino Rescue Center celebrated the birth of a male southern white rhino. Named Neville, he was born to first-time mom Livia—marking the third southern white rhino birth at the Rhino Rescue Center. Each birth is an important step forward in our efforts to save the critically endangered northern white rhino, of which only two remain on Earth. With the groundbreaking reproductive sciences and cutting-edge technologies being developed through our Northern White Rhino Initiative, **our hope is that one day, rhinos like Livia can become surrogate mothers for northern white rhino calves.**

### Continued Collaboration

Dr. Stephen Chege has a long relationship with us and is a former postdoctoral fellow with our Disease Investigations team. **He brings a deep knowledge of Kenya's wildlife and**



Neville and Livia

**conservation landscape, and moving forward, he'll provide guidance and support for our conservation activities in northern Kenya. He'll also serve as a liaison between us and our in-country partners and stakeholders so that together, we can continue to enact informed and inclusive strategies for conservation in Kenya.**

### Engaging Allies

Last fall, we celebrated International Culture Awareness Day and World Rhino Day at the Safari Park. These are invaluable opportunities to engage guests with our conservation work, and introduce them to awe-inspiring species they may not be familiar with.





# Savanna Conservation Hub

*continued*



Elephant calves

### Elephant Calf Update

We collaborate with partners in northern Kenya to rescue, rehabilitate, and reintroduce orphaned elephant calves into protected areas. Once released, we continue to monitor them. Drought has been hitting hard across the savanna, and wildlife and livestock in the region have struggled. Brief rains in the Sera Wildlife Conservancy allowed some temporary reprieve, allowing calves to keep up with wild elephants in larger groups. **Our ongoing monitoring of reintroduced calves continuously informs care, health, and management decisions as we work to protect endangered elephants.**

### Collaborative Emergency Care

Elephant endotheliotropic herpesvirus (EEHV) is a virus found naturally in Asian and African elephants around the world, though it can be deadly for younger elephants who don't have adequate immunity. When four-year-old Mkhaya, an

- HAPPENING**
- At the Zoo
  - At the Safari Park
  - Worldwide



Mkhaya participates in her own healthcare

African elephant at the Safari Park, presented with an elevated EEHV viral load in a routine blood sample, we immediately sprang into action. With the support of our partners, and the guidance of the North American EEHV advisory group, our wildlife health and care teams were able to provide around-the-clock care, administering fluids, oral antivirals, blood plasma transfusions, and stem cell treatments. With this dedicated and collaborative care, Mkhaya made a full recovery. **We're hopeful that this experience will provide critical information for long-term success in protecting elephants all over the world against this virus.**

### Supporting Healthy Rangelands

We have formed a new partnership with Grevy's Zebra Trust to improve rangeland health in Northern Kenya. **We've committed to expanding their Healing Rangelands program over the next three years, working to revitalize local grazing management and rangeland restoration so that all who depend on the savanna can thrive.** Through the program, communities establish livestock grazing plans, set up women's grass seed collectives, and organize invasive species removal and erosion controls. Healed rangelands benefit livestock-based livelihoods, while restoring herbaceous plants and improving water access—both essential for healthy populations of endangered Grevy's zebras.



Grevy's zebras

### Advising Development

Chief Conservation and Wildlife Health Officer, Dr. Nadine Lamberski, continues to advise on the strategic partnership with Kenya Wildlife Service (KWS) and Kenyan Ministry of Tourism and Wildlife, regarding the Nairobi Safari Walk and the entrance to the Nairobi National Park. **We continue to be an active adviser in the development of these plans, to support local wildlife conservation efforts in Kenya.**

### Furthering Partnerships

Mama Simba is a group of Samburu women that protects lions and restores rangeland habitat in their home community areas of Northern Kenya. They're part of Ewaso Lions, a Kenyan lion conservation nonprofit. Recently, Resson Kantai Duff (deputy director) and Munteli Lalparasaroi (Mama Simba coordinator) visited our conservation science and wildlife health teams in San Diego to share updates, tour the Safari Park, and discuss further collaboration opportunities. **This visit strengthens our partnership and allows us to better understand how we can support our in-country partners.**



# Pacific Islands Conservation Hub



'Akikiki (Hawaiian honeycreeper)

### A Lifeline for Hawaiian Birds

Conservation science and wildlife care staff met with U.S. Fish and Wildlife Service and State of Hawai'i biologists and managers in Honolulu to brainstorm and plan Hawaiian bird conservation breeding and reintroduction strategies. Also at the meeting was world-renowned conservationist Carl Jones, Ph.D., who praised our ongoing work to improve conservation breeding outcomes. Hawaiian forest birds are increasingly threatened—with several species on the brink of extinction. **The conservation breeding programs we've developed with our partners are an imperative lifeline for critically endangered birds, such as the 'alalā (Hawaiian crow) and 'akikiki (a type of Hawaiian honeycreeper).**



'Alalā

### 'Alalā Reintroduction Sites

Our Conservation Science team joined State of Hawai'i biologists to assess two potential 'alalā reintroduction sites on Maui—the Kīpahulu and Olowalu Forest Reserves. Once the site is chosen, reintroduction plans can be finalized. The next 'alalā reintroduction is projected for 2023 or 2024.

### Inspiring Artists

We recently arranged for local artists in Hawai'i to visit the Keauhou Bird Conservation Center. The artists were able to see and learn about endangered Hawaiian birds, and took photos in preparation for the Hawai'i Nei Exhibition featuring art with native species. **This successful visit made the birds accessible to local artists, who in turn are inspiring their communities through their artwork.** 📸



# Oceans Conservation Hub

### HAPPENING

- At the Zoo
- At the Safari Park
- Worldwide

### Tern Monitoring

We work with Naval Base Coronado to protect terns. Recently, we assisted with an initial study on the effects of microplastics on least tern reproduction. **With habitat degradation and limited food supply threatening these birds, it's critical that we understand impacts on tern reproduction, so we can devise informed conservation strategies.**

### Plovers Rescued and Released

Also at Naval Base Coronado, we recently helped our partners with the release of eight rehabilitated western snowy plovers. The birds were rescued and hand-reared—**five were orphans that would not have survived without human intervention, and all of them needed special care** because they displayed severely curled toes, a condition that is correctable if caught in time. Because this species is threatened, every bird is important for population recovery, and our teams continue to monitor them.



Lucas the African penguin

### Penguin Boots

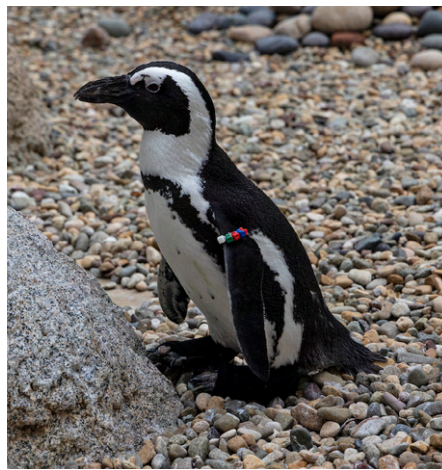
At the Zoo, African penguin Lucas received a set of custom-made boots to alleviate the effects of bumblefoot, a chronic, degenerative foot condition that affects his ability to walk, as well as his overall health. His new boots are cushioned and protective, to help his mobility as he navigates his rocky

habitat with greater ease. **The well-being of the wildlife in our care is our top priority, and because African penguins are endangered, every bird is vital.** These special boots were made possible through innovative collaboration with wildlife care and health teams, and veterinary orthotic company Thera-Paw. 📸



## The story of 'Lucas', the African penguin who will be able to walk again with the help of the San Diego Zoo

The "boots" that specialists at the San Diego Zoo designed especially for Lucas will help him walk and be pain-free from now on.



San Diego Zoo penguin receives custom orthopedic shoes / Courtesy of the San Diego Zoo

Lucas is a 4 year old African penguin. Some time ago, the keepers and specialists at the San Diego Zoo, which has been his home since his first moments of life, diagnosed him with "bumblefoot", a degenerative disease of the legs. Unfortunately, according to the diagnosis of the doctors who supervised his case, the condition is incurable.

Had it gone unnoticed, or without rigorous attention, the African penguin would be destined to not be able to walk well. To prevent the bird from losing its independence, zoo specialists "created and fitted Lucas with custom orthopedic shoes made of neoprene and rubber," they explain in a statement.

The San Diego Zoo researchers collaborated with Thera-Paw, an organization dedicated to designing and manufacturing rehabilitation and assistance products for animals with special needs. To solve Lucas's needs, they created a pair of 'boots' that prevent the penguin from developing ulcers, due to the pressure it exerts on his feet and ankles when standing up.

As described by the Naturalist platform, African penguins have "a medium size and a robust appearance." They can measure up to 70 centimeters tall, and weigh up to 5 kilos. Like Lucas, its plumage is black on both the wings and the legs and back. They live near the South Pole. Mainly, they are seen in South Africa and Patagonia.

With the intention of guaranteeing a good quality of life for Lucas, the teams from both institutions joined forces. Fortunately, Lucas has responded very well to his new pair of shoes From him:



The specially designed neoprene/rubber "boots" help Lucas walk and relax/ Courtesy of the San Diego Zoo

*"WE WERE PLEASANTLY SURPRISED BY THE IMMEDIATE CHANGE IN LUCAS AFTER WE PUT HIM IN HIS NEW BOOTS," SHARED DEBBIE DENTON, SENIOR WILDLIFE CARE SPECIALIST AT THE SAN DIEGO ZOO. "SEEING HIM MOVE NOW GIVES US HOPE THAT HE CAN BE OKAY IN THE FUTURE AND THAT HE CAN LIVE A FULFILLING LIFE."*

The improvement has been drastic, say the specialists. More than anything, because their 'boots' are padded. This will allow you to integrate back into the community without hassle. Even, according to Dr. Beth Bicknese, the San Diego Zoo's lead veterinarian, it will eventually be able to "display behaviors that are more typical of a penguin, such as rock climbing, swimming, nesting, and finding a suitable mate."



## San Diego Zoo welcomes birth of adorable white rhino calf



Ken Bohn/San Diego Zoo Wildlife Alliance

A male southern white rhino calf stands with his mother after playing in a mud wallow at Nikita Kahn Rhino Rescue Center at the San Diego Zoo Safari Park. The unnamed calf was born on August 6th, 2022.

An adorable baby white rhino was born at the San Diego Zoo – and conservationists hope his birth might signal good news for his endangered cousins.

The unnamed rhino calf was born on August 6th to first-time mother Livia and father J Gregory, according to a news release from the San Diego Zoo.

The baby is "healthy, confident and full of energy," the zoo staff says, adding, "Livia is an excellent mother, very attentive and protective of her offspring."

There are two subspecies of white rhinoceros: southern and northern. The baby is a southern white rhino, which is listed as "Near Threatened" by the International Union for Conservation of Nature (IUCN). There are around

10,000 southern white rhinos in the wild, according to the IUCN.

But it's a far different story for the species' northern cousins, whose population has been devastated by poaching for their horns and other body parts. There are just two northern white rhinos left, a mother-daughter pair living in a conservancy in Kenya. Neither have been able to carry a pregnancy to term.

That's where Livia – the San Diego Zoo's newborn calf's mother – comes in. Her successful pregnancy means that she may be a candidate to carry a northern white rhino embryo in the future.

"Livia is now among the female rhinos at the Nikita Kahn Rhino Rescue Center who could potentially serve in the future

as a surrogate mother to a northern white embryo," says the release.

The San Diego Zoo's Northern White Rhino Initiative hopes to use cutting-edge reproductive technology to try to save the species from the brink of extinction. The zoo is also home to a so-called frozen zoo, a cryobank that stores reproductive cells and embryos from almost 1,000 species, including 12 northern white rhino cell lines.

Someday, these cell lines may be used to create northern white rhino sperm and egg cells, leading to embryos that could be implanted in surrogate mothers like Livia, says the news release.

"All rhino births are significant," the zoo adds.

# Los Angeles Times

## White rhino calf born at San Diego Zoo Safari Park



A newborn male southern white rhino calf stands with its mother after playing in a mud wallow at the San Diego Zoo Safari Park.

Ken Bohn/San Diego Zoo Wildlife Alliance

SAN DIEGO — The San Diego Zoo Safari Park on Monday announced the arrival of a male white rhino born to a first-time mother.

The park tweeted a video of the curious new calf following its mom, Livia, around at the Nikita Rhino Resource Center.

The unnamed calf conceived through natural breeding with the father, J Gregory, was born Aug. 6.

“Wildlife care specialists report the calf is healthy, confident and full of energy, and that Livia is an excellent mother, very attentive and protective of her offspring,”

the park said in a statement.

Livia and the calf will remain in a private habitat to allow time for bonding before being introduced to the other rhinos living at the resource center.



## After years of waiting, rare turtles have bred 41 hatchlings at the San Diego Zoo



One of the Indian narrow-headed softshell turtle hatchlings bred at the San Diego Zoo.

Ken Bohn/San Diego Zoo Wildlife Alliance

In a first for North America, an endangered species of turtles has bred at the San Diego Zoo.

Over the summer, staff at the zoo welcomed 41 hatchlings from the Indian narrow-headed softshell turtle species, which is native to South Asia. It makes the zoo the first accredited organization in North America to hatch and raise the species.

Three Indian narrow-headed softshell turtles have been at the zoo for more than 20 years. All that time, zoo staff had been hoping they would one day reproduce.

The San Diego Zoo Wildlife Alliance, which operates the zoo, announced the discovery on Monday.

“This is a thrilling moment for us at the San Diego Zoo, and an incredible step forward in the conservation of this species,” said Kim Gray, curator of

herpetology and ichthyology at the San Diego Zoo, in a statement.

The eggs were found in two separate nests. Some of the turtles hatched in their habitat, while most of the eggs were stored in an artificial incubator to create the optimal conditions for survival. Turtle experts at the zoo say nests are often tough to find in the enclosure, as the turtles like to lay their eggs overnight and cover them with dirt.

The Indian narrow-headed softshell turtle, also known as the small-headed softshell turtle, is native to northern India, Bangladesh, Nepal and Pakistan, where the animals live at the bottom of deep freshwater rivers and streams. The turtles typically breed during the monsoon months in central India and during dry months in other areas, according to the Wildlife Institute of India.



Ken Bohn/San Diego Zoo Wildlife Alliance

Hatchlings are quite small but can grow to a few feet.

When emerging from their shell, hatchlings can be as small as about 4 centimeters. They can grow to as long as 3.6 feet from the front to back of the top shell.

The species is listed as endangered on the International Union for Conservation of Nature’s Red List, though it’s unclear how many remain in the wild. Environmental pollution, sandbar habitat destruction, the international pet trade and human food harvesting have all contributed to the species’ decline over the years, the San Diego Zoo Wildlife Alliance says.

“We have been focused on caring for these turtles for a very long time, and part of that care is to gain a greater understanding of the species’ natural history,” the zoo’s Kim Gray added. “With the knowledge we gain here at the Zoo, we can better assist our partners in India to help this essential species thrive in their native habitat.”

# The New York Times

## With Fall Migration, Bird Flu Flies Back Into Town

**Zoos, bird rescue groups and other animal facilities are grappling with a “radically different” outbreak of avian influenza.**

When a highly contagious strain of avian influenza began racing across the United States this spring, the Raptor Center at the University of Minnesota prepared for an influx of ailing birds.

“But we never could have anticipated the flood of patients that arrived,” said Dr. Victoria Hall, executive director of the center, which provides medical care for birds of prey.

From late March to early June of this year, Dr. Hall and her colleagues saw more than 180 flu-afflicted birds, including scores of great horned owls, red-tailed hawks and bald eagles. Many were severely ill, suffering from seizures or unable to see or stand. Caring for these animals — just one of which survived — was emotional, draining work that required long hours in personal protective equipment, including Tyvek suits and respirators.

So it came as an immense relief when cases tailed off this summer, falling to just one in July and zero in August.

But in September, the sick raptors returned. Last month, the center had 11 confirmed cases of the avian flu, Dr. Hall said: “It’s definitely coming back through.”

This year’s avian influenza outbreak is the worst the United States has experienced since 2015, the last time the country was hit hard by bird flu. So far, the virus has affected 47 million farmed birds, nearly the same number as in the 2014-15 season.

But by all other measures, this year’s outbreak is “radically different than what we’ve seen before,” said Bryan Richards, the emerging disease coordinator at the National Wildlife Health Center, which is part of the U.S. Geological Survey.

This year’s is more wide-ranging, spreading to almost every state, and is having a much greater effect on wild birds, infecting more than 100 species in North America, according to Mr. Richards. (The virus currently poses little risk to humans, experts say.)

And, unlike in 2015, the virus did not fizzle out over the summer. Instead, it continued to circulate in wild birds, many of which spend their summers in the Arctic.

Now, as wild birds fly south for the winter, they are bringing the virus with them. Cases are climbing again in a number of northern states and popping up for the first time in some southern ones, such as Mississippi, Arkansas and New Mexico.

Poultry farms are familiar with the risks of avian influenza, but for many zoos, rehabilitation centers and facilities that house wild birds, it is a formidable new threat. They are bracing themselves for a resurgence — and wondering whether the virus is here to stay.

“We’ll just have to be on alert,” said Dr. Trevor Zachariah, the director of veterinary programs at Florida’s Brevard Zoo, where infected wild vultures keep finding their way onto the property. “We may have to live with this.”

### Spring surge

Avian influenza wings its way around the world in the bodies of migrating birds, especially in water birds such as ducks, geese and gulls. Some of these birds, which can carry the virus without showing symptoms, share summer habitats in the Arctic, where they may swap pathogens, picking up new flu strains.

“It’s like bringing the kids to day care from different suburbs,” said Dr. Keith Poulsen, director of the Wisconsin Veterinary Diagnostic Laboratory. “As they commingle, that’s where the virus moves around on a global scale.”

As infected birds migrate, they shed the virus in their feces, mucus and saliva, seeding infections in flocks of farmed fowl, in which some flu strains can be fatal.

The current outbreak began in late 2021, when a highly pathogenic strain



Brevard Zoo

A scarlet macaw living in a temporary, behind-the-scenes habitat at the Brevard Zoo in Melbourne, Fla.

of flu known as Eurasian H5N1 was detected in birds in Eastern Canada. The virus made its way down the Atlantic coast to Florida and then exploded this spring, when migrating birds carried the pathogen north and west.

Along the way, it not only infiltrated hundreds of commercial flocks but also began felling wild birds, taking out entire families of owls and triggering die-offs of geese and gulls.

“We’ve never seen anything like this before,” said Ashton Kluttz, the executive director of the Bird Rescue Center in Sonoma County, Calif., which created extra makeshift hospitals to handle the patient load.

(The virus also found its way into mammals, from foxes to seals.)

Scientists are not yet certain why the virus is taking such a high toll on wild birds this year. It may be that the virus has changed to become more contagious among wild species or better adapted to them. A cold, wet spring might also have given the virus more opportunity to take hold in wild populations, Dr. Poulsen said.

Rehabilitation centers, sanctuaries and zoos have scrambled to put new precautions in place, moving vulnerable birds inside and suspending public programs. After Tri-State Bird Rescue & Research, in Delaware, identified its first case in February — triggering a three-week quarantine — it adopted new disinfection protocols and stopped accepting waterfowl from other rehabilitation centers.

“We have — fortunately, knock wood — not had an outbreak at our center,” said Lisa Smith, the rescue’s executive director. But, she added, “We know the virus is still out there.”

### Fall flights

Cases ebbed in many places this summer, but the virus never completely disappeared. Now, it’s on the move.



Flamingos at the San Diego Zoo were moved to a covered habitat.

Ken Bohn/San Diego Zoo

Blue-winged teal, a type of duck, are among the first species to fly south in the fall. In mid-September, three hunter-harvested teal tested positive for the virus in Mississippi, marking the first detections in that state. The finding affirms that, “Yes, the virus persisted in northern latitudes through the summer,” Mr. Richards said. “And it’s coming back on the wings of wild waterfowl.”

Wisconsin began to see a spike in wild bird infections around Labor Day, Dr. Poulsen said, and recently documented its first poultry outbreaks since May. “We were really hoping that we were out of the woods,” he said.

The virus appears to be making a comeback in other northern regions, including Minnesota, North Dakota and Alberta, Canada. So far, experts have said, the surge has been smaller than it was in the spring. “But there’s lots more geese and ducks to come down out of the Arctic,” said Margo Pybus, a provincial wildlife disease specialist at Alberta’s Fish and Wildlife Division.

Farther south, wildlife facilities are preparing for a flood of fall migrants. Southern California was spared in the

spring, but Dr. Hendrik Nollens, the vice president of wildlife health at the San Diego Zoo Wildlife Alliance, does not expect to be so lucky this fall.

The San Diego Zoo and its sister facility, the San Diego Zoo Safari Park, covered their outdoor aviaries and removed food and water sources that might attract avian interlopers, even going so far as to drain a pond popular with wild ducks. They also moved 900 birds into more protected habitats — “a herculean effort” that involved relocating hundreds of flamingos, Dr. Nollens said.

To pull off the feat, employees guided many of the flamingos into enclosed trailers, which delivered the animals to covered or indoor habitats. Staff members modified these new spaces to suit the leggy wading birds, adding feeding pools, trimming low-hanging tree branches and raising the sprinklers designed to keep their feathers in fine fettle.

When the flamingos will return home is unclear. “When do we stop doing these things is actually a tough challenge,” Dr. Nollens said. “We don’t know what’s going to happen from here.”

### The long haul

The signs from Europe, where the outbreaks began earlier than they did in North America, were not encouraging. There, the virus has persisted through multiple migration cycles, fueling “the largest avian flu epidemic” ever observed on the continent, according to the European Center for Disease Prevention and Control.

Although the scope and scale of future outbreaks is hard to predict, scientists said that they expected the virus to persist through the winter, then to travel north again in the spring. “I don’t see any reason to suggest this is going to go away anytime soon,” Mr. Richards said.

And if the virus does stick around? “It is going to have huge implications for anybody with either permanently captive or transitory captive wildlife in their care,” Dr. Hall said.

The Raptor Center plans to continue testing all incoming patients for the virus indefinitely and is considering building a more permanent triage and quarantine area, she added. In California, the Bird Rescue Center recently decided to add an avian influenza unit to its new facility, which is not slated to open until at least late 2023.

The Oregon Zoo, which moved many of its birds indoors in August, does not want to keep the animals cooped up for long. “It’s just not good welfare,” said Dr. Carlos Sanchez, the zoo’s head veterinarian.



A great horned owl being examined at the Bird Rescue Center in Sonoma County, Calif.

Joshua Asel/Bird Rescue Center

“They need the space to move. They need the sun.” So employees are working to reopen aviaries with new precautions in place, such as foot baths where visitors can disinfect their shoes.

In the long run, managing the risks may require facilities to be watchful and nimble, tightening and loosening precautions as outbreaks flare and fade.

At the Pittsburgh Zoo & PPG Aquarium, for instance, employees will return to wearing full P.P.E., as they did this spring, if the virus is reported in the surrounding county, said Dr. Justin

Rosenberg, an associate veterinarian at the zoo.

After the spring surge, combined with more than two years of coronavirus-related precautions, there is definite “preparedness fatigue,” Dr. Rosenberg acknowledged.

But the zoo is eager to protect its avian charges, which include flamingos, ostriches and a 3-year-old duck with “one of the best names that I have encountered,” Dr. Rosenberg said. “We are doing whatever we can to keep Ritz Quacker safe.”



The Raptor Center

A great horned owl that was treated for bird flu at the University of Minnesota Raptor Center this spring, and a rare survivor, was released into the wild.

Published October 11, 2022

By Vishwam Sankaran



## Global warming forcing monkeys and lemurs to climb down trees, study finds

Tree-dwelling primates forced to the ground in search of food, water and shelter

Global warming and deforestation are driving monkeys, lemurs and other predominantly tree-dwelling primates more frequently to the ground for food, water and shelter, according to a new study.

The research, published in the journal PNAS on Monday, warned this change could put tree-dwelling species at higher risk due to a lack of their preferred food and shelter on the ground.

Scientists, including those from the nonprofit San Diego Zoo Wildlife Alliance (SDZWA) in the US, said these primates may experience more negative interaction with humans and domestic animals as the world warms and may undergo a change in their dietary habits.

In the study, an international team of scientists assessed more than 150,000 hours of observation data on 15 lemur species and 32 monkey species at 68 sites in the Americas and Madagascar.

Researchers estimated the influence of several factors such as potential human-induced and ecological pressures, as well as species-specific traits, on the time spent on the ground by these arboreal primates.

“This study began with a discussion among colleagues about how we’d noticed certain populations of arboreal primates spending more time on the ground, yet at sites with relatively less disturbance, members of the same species may never descend to the ground,” study co-author Timothy Eppley from SDZWA said in a statement.



Scientists found that the primates, which lived in hotter environments and with less canopy cover, largely adapted by shifting to extensive ground use.

But the monkeys and lemurs living closer to human infrastructures are less likely to descend to the ground, researchers added, suggesting human presence may interfere with the adaptability of these species to climate change.

The findings also suggested primates consuming less fruit and living in large social groups are more likely to descend to the ground.

Scientists suspect these traits may be a potential “pre-adaptation” to ground-based living.

With the worsening climate crisis and diminishing tree habitats, researchers said primates consuming a more

generalised diet and living in larger groups may more easily adapt to a ground-based lifestyle.

Spending more time on the ground may likely “cushion” some primates from the effects of forest degradation and global warming, they said.

However, scientists cautioned that for less-adaptable species, fast and effective conservation strategies will be essential to ensure their survival.

“Though similar ecological conditions and species traits may have influenced previous evolutionary shifts of arboreal primates, including hominins, to ground living, it is clear that the current pace of deforestation and climate change puts most primate species in peril,” said Giuseppe Donati, another co-author of the study from Oxford Brookes University.



## Monkey see, monkey go: How climate change, deforestation are putting some primates in a bind

### Key Points

- Primates already face “unprecedented challenges,” researchers said, and climate change is likely to bring additional burdens, according to the study.
- The study by a group of more than 100 researchers found species in large social groups or in hotter places with less canopy cover might be pre-wired to adapt to change.

Some species of monkeys, lemurs and other primates may be leaving their leafy homes more often as the warming climate affects tree canopies in their forests, according to a new study by a group of more than 100 researchers.

Human activities that bring higher temperatures and deforestation send arboreal primates to the ground more often in Central and South America and Madagascar, increasing their risk of interaction with people and predators, the study reported.

That could ultimately, however, give them an edge over primates that can't adapt as easily.

Primates already face “unprecedented challenges,” researchers said, but the paper published Monday in the Proceedings of the National Academy of Sciences suggests they'll encounter additional burdens from climate change. It examines which traits help primates adapt to change.



Timothy Eppley/San Diego Zoo Wildlife Alliance

This member of one of the lemur families, a *Propithecus Verreauxi*, lives in Madagascar. A group of researchers published a study on Oct. 10, 2022 saying arboreal primate species are at greater risk from deforestation and climate change, which may send some species to the ground in search of food and cooler temperatures.

A multifaceted diet and living in larger groups appear to give some species an advantage, said the study's lead author, Timothy Eppley, a postdoctoral associate at the San Diego Zoo Wildlife Alliance. While they adapt by dropping to the ground more often, other species do not and may need higher priority conservation efforts, Eppley said.

During 150,000 hours of observation, they studied 15 lemur species, and 32 species from four families that include howler monkeys, tamarins, capuchins and squirrel monkeys.

Putting together such a massive amount of information was “a huge job” by Eppley, said co-author Karen Strier, a professor in the University of Wisconsin-Madison's anthropology department. Strier has studied the northern muriqui, a primate species in Brazil since 1982.

Eppley started the project after noticing some species of bamboo lemurs in Madagascar spent more time on the ground, while the same animals in less-disturbed locations never descended.

Researchers found species in large social groups or in hotter places with less canopy cover might be pre-wired to adapt to change, Eppley said.

Primates that live farther away from roads and people spend more time on the ground than those living closer to people, which may suggest humans interfere with their natural adaptability, stated Luca Santini from Sapienza University of Rome, a senior scientist who collaborated on the study.

Many species are already burdened with living in fragmented and heavily disturbed environments with fewer food sources. The authors concluded an ability to eat other kinds of plants and not just



Timothy Eppley led a study of primates in the Americas and Madagascar looking at traits that may help them survive a changing climate.

San Diego Zoo Wildlife Alliance

fruit, and to spend time on the ground in areas where tree cover is sparse and temperatures are warmer, may help buffer species against extinction.

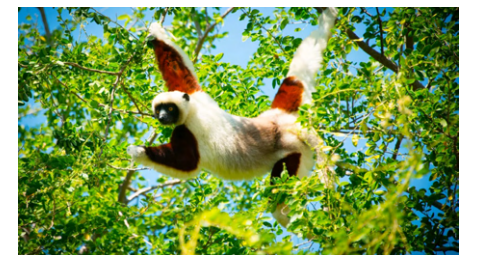
Other species, such as some of the lemurs in Madagascar, eat only fruit and need forest habitat, which is rapidly declining, Eppley said.

The world's fourth-largest island, Madagascar has a population of nearly 28 million people. Forests and lands are being cleared for agriculture and also are battered by tropical cyclones, increasingly fueled by higher sea surface temperatures.

But primates who leave the canopy face new predators on the ground, particularly feral dogs and cats. In Madagascar, he said, feral dogs and cats outcompete the island's natural predators.

“It is clear that the current pace of deforestation and climate change puts most primate species in peril,” said Giuseppe Donati, a study collaborator at Oxford Brookes University.

Conservation organizations must come up with interventions such as wildlife



Natural Habitat Adventures

Madagascar Denise Ramsey

corridors or relocations to maintain genetic diversity, Eppley said.

Primates have proven to be “incredibly adaptable, but they are being pushed and climate change is one of the many big threats, both directly and indirectly,” Strier said. “We really need to find ways to protect primates.”

Despite primates' ability to adapt, she said, “We can still push them into extinction and there's really no excuse for that.”

# People

## 9-Year-Old San Diego Zoo Mouse Named Oldest Mouse in Human Care by Guinness World Records

The tiny Pacific pocket mouse, named Pat after Patrick Stewart, weighs about the same as three pennies and is part of a San Diego-based conservation breeding program for the endangered species



Ken Bohn/San Diego Zoo Wildlife Alliance

A tiny Pacific pocket mouse named Pat earned a big honor on Wednesday.

Pat — named after actor Patrick Stewart — resides at the San Diego Zoo Safari Park, and at 9 years and 210 days old, he is the oldest mouse in captivity. On Feb. 8, he was officially recognized as the “oldest living mouse in human care”

by Guinness World Records, according to the San Diego Zoo Wildlife Alliance.

“This recognition is so special for our team, and is significant for the species,” Debra Shier, the associate director of recovery ecology at San Diego Zoo Wildlife Alliance (SDZWA), said in a news release. “It’s indicative of the dedication

and incredible care we as an organization provide for each species, from the largest to the very smallest.”

Shier established the organization’s Pacific pocket mouse conservation breeding program. The species is endangered due to human encroachment on its habitat.



Ken Bohn/San Diego Zoo Wildlife Alliance



Once a vibrant part of the ecosystem stretching from Los Angeles to the Tijuana River Valley, the species was thought to be extinct until a small remnant population was discovered in 1994 in the Dana Point headlands of Orange County, according to the SDZWA. The mice typically live no further than two miles from the ocean in coastal scrublands, dunes, and riverbanks.

“This acknowledgment is also a symbol of appreciation for species that people don’t know much about because they’re not charismatic megafauna, but are just as critical for ecosystem function,” Shier said. “These overlooked species can often be found in our own backyards—like the Pacific pocket mouse.”

The smallest mouse species in North America, the Pacific pocket mouse, gets its name because it uses the pockets or pouches in its cheeks to carry food and nesting materials. They are beneficial to the environment because the animals disperse seeds of native plants and encourage plant growth through their digging activities, SDZWA said.

Pat, who weighs about the same as three pennies, was born on July 14, 2013, in the first year of the Pacific pocket mouse conservation breeding program at the San Diego Zoo Safari Park.

Last year, SDZWA bred a record 31 litters (117 mouse pups) during the spring and summer seasons.





San Diego Zoo Wildlife Alliance 2116 Advisors is an exclusive group of philanthropists, conservation leaders, and conservation scientists providing counsel and support to help us fulfill our vision of a world where all life thrives.