SPRING/SUMMER 2019

LINCOLN PARK ZOO®

FOR WILDLIFE. FOR ALL.

Animal Welfare: A Holistic Approach

All The Care In The World

Conserving Lake County Amphibians

LINCOLN PARK ZOO
FOR WILDLIFE. FOR ALL.

SPRING/SUMMER 2019
VOLUME 18, NUMBER 1

FEATURES

DEPARTMENTS

Cover: The oriental fire-bellied toad, found at Regenstein Small Mammal-Reptile House. Learn about the zoo's efforts to protect wild amphibians, the most endangered taxonomic group in the animal kingdom, on page 14.
Photo by Chris Bijalba

LINCOLN PARK ZOO MAGAZINE

CONTRIBUTING EXECUTIVE STAFF

PRESIDENT AND CEO
Kevin J. Bell

ZOO DIRECTOR
Megan Ross, Ph.D.

VICE PRESIDENT OF MARKETING AND COMMUNICATIONS
Beth Krauss

CREATIVE DIRECTOR
Lena McDonagh

DIRECTOR OF PUBLIC RELATIONS
Jillian Braun

MAGAZINE STAFF

EDITORS
Jillian Braun
Craig Keller
Chris Pullam

ART DIRECTOR
Joann Raia

CONTRIBUTORS
Ashley Bedore
Chris Bijalba
Beth Botts
Michelle Falco
Julia Fuller
Hyson Gibbon
Jazmin Rios

Our Impact Depends on You

Who funds Lincoln Park Zoo? You do! Zoo members, donors and visitors help cover around 80% of our annual operating costs to keep this non-profit, privately managed institution open and free every day and support its mission of wildlife conservation, animal care and learning. Support the zoo at *lpzoo.org/donate*.

Go Online for More
Visit *lpzoo.org/magazine* for special web-only features—including photos, video, and blog posts—inspired by the stories in this issue.

Always Improving

At just 49 acres, Lincoln Park Zoo is pretty small. But with more than 40 full time scientists on staff, an animal care program informed by real-time data, and a decades-long commitment to environmental conservation, we make a big impact.

As a guiding principle, we always seek to do better, to do more. Today we're innovating and making improvements in both physical spaces—Searle Visitor Center and the soon-to-be-renovated Kovler Lion House, for example—and programmatic areas, including one of our newest initiatives, which we explore in this issue: the Animal Welfare Science Program.

Many zoo-based scientists focus on animal welfare in an effort to make systemic improvements over time. What we're most excited about with our Animal Welfare Science Program, though, is that it's a team effort designed for action. Using techniques such as the Lincoln Park Zoo-designed app ZooMonitor, we gather information daily that allows us to make immediate decisions to promote positive welfare for the animals in our care. The Animal Welfare Science Program feature in this issue (page 8) shares some case studies showcasing how we evaluate and enhance welfare, demonstrating what it means for animal welfare science to move from abstract to actionable.

In this issue, you'll also find out how we care for animals at Regenstein Small Mammal-Reptile House, how we research amphibian health in the wild, and how you can play an active role in supporting local wildlife.

When you visit the zoo this spring, you may notice that animals are slowly being moved out of Kovler Lion House. They are moving to other Association of Zoos and Aquariums-accredited facilities to prepare for the renovation of this historic habitat. You may see volunteers on grounds with digital tablets, recording data on animals' activity in ZooMonitor. You'll see new labels on our plants and trees as we highlight flora as a key component of natural spaces and wildlife-friendly environments.

All of this is in the interest of doing better, doing more to increase the positive impact we can have on our environment and promote positive welfare for the animals in our care. I invite you to share in our impact by visiting the zoo, attending an event, joining as a member, or making a donation. Thank you for your support.

For Wildlife. For All. ■

KEVIN J. BELL
PRESIDENT AND CEO

Treetop Tyke

Lincoln Park Zoo welcomed a new member to its resident population in November: a baby De Brazza's monkey. In a public vote, fans of the zoo named the infant "Bomani," meaning "warrior." Zoo guests can visit Bomani at Helen Brach Primate House. The offspring is the result of a breeding recommendation from the De Brazza's Monkey Species Survival Plan®, a shared management effort by zoos throughout the Association of Zoos and Aquariums.

De Brazza's monkeys are naturally reclusive. This treetop-dwelling primate species avoids contact with other animals and is adept at remaining undetected through silence and concealment. Named after the Italian-French explorer Pierre Savorgnan de Brazza, the species belongs to a related group of so-called "old world" monkeys commonly known as guenons. Infants are born fully furred and with eyes open. Females nurse and care for their young until they become independent, sometime around the age of 1 year.

Photo by Julia Fuller

BY CRAIG KELLER

Worthy Welcome

Lincoln Park Zoo's Searle Visitor Center opened in November, capping a year long celebration of the zoo's 150th anniversary. The sleek building includes separate structures connected by an aluminum canopy laser-cut with a nature-inspired, organic pattern—a modern nod to forested wildlife habitats the zoo emulates in its habitats and strives to protect in the wild. Dedicated to the 3.6 million visitors the zoo welcomes each year, the $9.3 million project is part of the zoo's $135 million *The Pride of Chicago* capital campaign.

It includes Guest Services, a Member Center supported by the Women's Board of Lincoln Park Zoo, curated gardens, and accessible and family restrooms. It's the best place to get information, maps, and program times; rent a stroller; purchase same-day tickets to a Malott Family Penguin Encounter; or borrow a sensory bag or wheelchair (free accessibility resources). It also houses a small space for nursing or to use as a quiet room. Zoo staff and volunteers are on hand to answer questions and customize visits during operating hours and events.

The Member Center includes member services and a member lounge. Any guest can stop into the Member Center to join the zoo, renew a membership, purchase an ADOPT package, buy a gift for a zoo animal from our Wish List, or make a donation. Joining the zoo provides benefits such as access to the Member Center, free parking, invitations to members-only events, discounts on public events, and savings at our gift shop.

The Member Center also offers planned and pop-up chats. Starting March 13, zoo staff will share information on their role at Lincoln Park Zoo, including their personal story, at 1:30 p.m. each Wednesday and Friday. This summer, the program will expand to include additional days and experts, giving members an opportunity to learn about the zoo at a whole new level.

Photo by Mary Kate Lucarelli

Students Citlali Rodriguez, Yaslyn Salgado, Jennifer Rodriguez, and Lesley Villalba showcase their artwork (below). Left, a multi-media piece highlights the impacts of palm oil on primates.

Photo by Linda Wojtowicz

Brushing Up on Conservation

Nobody wants to see African penguins swimming in a sea of plastic…unless it's an adorable mixed-media collage crafted by students.

According to one team of students, using plastic is "normalizing something that isn't normal." Various plastic pieces were carefully pieced together to make icebergs with a row of penguins waddling on top. "We hope people start recycling and using reusable bottles or containers instead of using plastic."

The program, piloted in 2017 by the zoo's Learning department, encourages youth to speak up for wildlife through the universal language of art. Its themes are aligned with conservation actions the zoo advocates, such as avoiding single-use plastics. This year's high schoolers focused on penguins and primates, creating art to depict how monkeys and apes in the wild are imperiled by the illegal pet trade, as well as deforestation for palm oil, timber, and precious metals.

Students and art teachers from each school visit the zoo, where educators, keepers, and scientists provide guided, interpretive tours of animal exhibits and share how the zoo's care and conservation efforts at home and around the world help save species. School groups bring that knowledge back to their classrooms, transforming conservation messaging into art of their choosing: paintings, sculptures, and even performance art. At their pop-up show on January 11, students from Instituto Health Sciences Career Academy choreographed an interpretive dance about primates and penguins, a sequel to their 2018 bubble-blowing, neon-costumed dance celebrating cichlid fish.

Photo by Mary Kate Lucarelli

Canvas for Conservation was inspired by the zoo's teen Conservation Ambassador Board winning first place in Project Polar Bear. The global competition—held in 2017 by Polar Bears International, a conservation organization and zoo partner—challenged teens to create community projects aimed at reducing carbon emissions.

"That showed us how powerful teen voices could be for conservation and how compelling the medium of art is in telling those stories," says Teen Programs Coordinator Andy Weber. "Every student has different motivations to participate in conservation initiatives—whether it be via math, science, or art—which is why the zoo strives to provide as many pathways for students as possible."

Photo by Chris Bijalba

Tales of the City

It's easy to think of cute squirrels and handsome cardinals as urban wildlife. Rats? Not so much.

Researchers from the zoo's Davee Center for Epidemiology and Endocrinology and Urban Wildlife Institute (UWI)—who've teamed up with local, science-based Landmark Pest Management for a study of the reviled rodent—have a less biased point of view.

"Rats, whether or not we like it, are a part of our ecosystem," says Wildlife Disease Ecologist Maureen Murray, Ph.D. "They are a fascinating species we have relatively little research available on, and we aim to change this."

Rats fit neatly into the zoo's goal to understand and mitigate human-wildlife conflict. Their ubiquitous presence and proximity to humans in cities worldwide makes for possible risks to public health and damage to property.

Landmark tested whether neighborhoods making more rat complaints within a one-year span also had more rats by trapping the species across 13 community areas in Chicago. The zoo's researchers used rates of rat-trapping success as a measure of rat abundance and compared that data to publicly available data on complaints, incomes, rental properties, and land cover. The amount of garbage, clutter, and structural integrity of buildings adjacent to the trapping sites were also measured to see if they increased rat problems at a more local scale.

Their findings, published in the scientific journal *Frontiers in Ecology and Evolution*, confirmed that, indeed, rats are more prevalent in neighborhoods with higher complaint rates. Researchers also learned that uncontained garbage is the biggest attractant for rats ("Stash your trash," advises Murray), and densely populated neighborhoods with more rental units—specifically on the city's north and northwest sides—had more rats compared to areas with more vacant lots.

"More research is needed," says Murray, "but it seems those neighborhoods also had increased garbage and potential rat-access points in alleyways, presumably due to the responsibility of maintenance being on the property owner rather than the tenant."

The ongoing study will also measure rat stress levels through hair sample analysis using Davee Center's endocrinology lab, as well as disease types and prevalence. Further ahead, this urban rat research may benefit other municipalities.

"Every city and urban property owner is required to manage rats," says Rebecca Fyffe, Landmark's director of research. "So our discoveries about rats in Chicagoland may help wildlife managers and urban planners in other cities as well."

Tome Sweet Tome

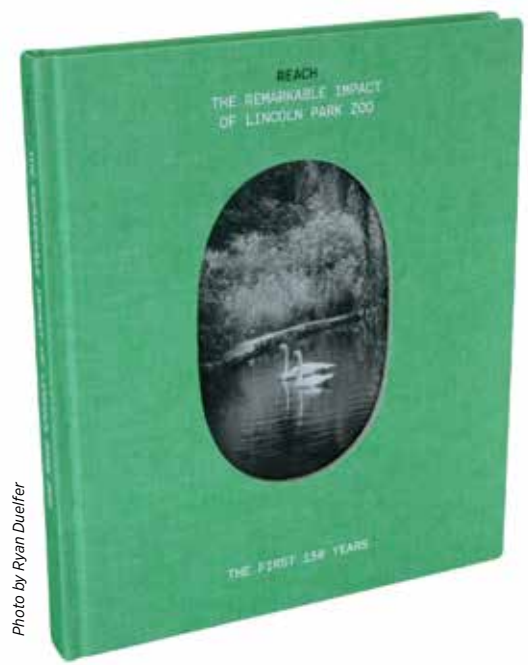


Photo by Ryan Duelfer

Reach: The Remarkable Impact of Lincoln Park Zoo is available at the zoo's gift shop! The book, which commemorates the zoo's 150th anniversary in 2018, features stories, illustrations, and photos about what the zoo has meant to civic leaders, scientists, staff, visitors, members, and many others though the years. Shop online at *lpzoo.org/shop*.

Seabird Samaritans

Chris Fuehrmeyer and Kristin Dvorak, lead and assistant lead bird keepers at Lincoln Park Zoo, provide expert care for the African penguin colony at Robert and Mayari Pritzker Penguin Cove. Their experience and knowledge was warmly welcomed last November when they traveled 8,487 miles to Cape Town, South Africa, to help rehabilitate penguin chicks at the Southern African Foundation for the Conservation of Coastal Birds (SANCCOB).

The non-profit organization, which celebrated its 50th anniversary in 2018 with a new hospital and renovated facilities, helps rescue, rehab, and release ill, injured, abandoned, and oiled (from tanker spills) seabirds. The African penguin, an endangered species with a population under 50,000 in its native southwestern Africa coastal range, makes up most of its intake.

Fuehrmeyer and Dvorak spent two weeks rehabilitating chicks abandoned by parents in the species' two Western Cape beach colonies—including Boulders Beach, which inspired the design of the zoo's penguin exhibit. Environmental shifts caused by climate change have disrupted their breeding and molting seasons. If adult breeding pairs molt while incubating eggs or raising chicks, their feathers aren't waterproof and they can't hunt for fish to feed their offspring. Often, they choose to fend for themselves and abandon the nest.

At SANCCOB Dvorak and Fuehrmeyer fed chicks a nutrient-rich fish slurry and supervised timed swims in pools that prep chicks for the real deal when they return to the ocean. Dvorak worked with very young, downy chicks in need of temperature-controlled heat lamps and group huddling when sleeping. Fuehrmeyer's charges were older chicks closer to wild-release approval.

"It's a constant movement of chicks," says Dvorak. "They're coming in from the wild, going to ICU for vet treatment, or advancing in rehab, which means they can swim longer and aren't handled as much." New arrivals could be "kind of wild and intense or hide in the corner," she adds, "but after a few days they'd calm down."

The two keepers were fortunate enough to also participate in the release of 21 penguins at Boulders Beach, the kick off event at the Simon's Town's annual African Penguin Festival. Conservationists, residents, and visitors witnessed the release, then flocked around food trucks to celebrate the occasion.

"It was an emotional experience," says Fuehrmeyer. "Four adults were included in the mostly juvenile group because they have the instinct to lead the chicks. The younger ones hesitated for about 30 seconds at the shoreline and then, together as a group, went out into the ocean."

Photos by Chris Fuehrmeyer and Kristin Dvorak

Photo by Chris Bjalba

Reintro Redux

Lincoln Park Zoo, in partnership with the International Union for the Conservation of Nature's Reintroduction Conservation Translocation, hosted the 2nd International Wildlife Reintroduction Conference in November. After a successful conference at the zoo in 2008, scientists from around the globe convened in Chicago to share information, triumphs, and tribulations from experiences restoring wildlife to the wild. While there have been several high-profile reintroductions responsible for bringing species back from the brink of extinction over the past decades—such as California condors, black-footed ferrets, and golden lion tamarins—wildlife reintroduction remains inherently challenging. More than 40 speakers presented new research findings to foster collaborations and improve the success rates of future reintroduction programs. ■

Providing Opportunities to Thrive

INTERVIEW BY CRAIG KELLER
WRITTEN BY JILLIAN BRAUN

How does an animal tell you how they're feeling or what they're experiencing? Science. More specifically through the Animal Welfare Science Program, a formalized initiative to better understand each individual in the zoo's care.

Photo by Sarina Benoit

An African penguin voluntarily participates in a Malott Family Penguin Encounter which were observed by welfare scientists before, during, and after to evaluate the impacts on individual penguin welfare.

Photo by Chris Bjalba

The dedicated Animal Care staff at the zoo work 365 days a year to feed specialized diets, create dynamic habitats, and provide appropriate companionship for social species, among many other tenets of care. Expert care represents every facet of what the Animal Care staff provide to our animals on a daily basis. But what about the things that aren't easily measured? How do the animals actually experience their day? How does Animal Care staff know if the hens are comfortable and content in their new coop or what motivates the fennec fox to engage in foraging behaviors? Ultimately—how does Animal Care ensure the zoo is creating an environment in which individual animals can flourish? That is exactly the question the zoo's Animal Welfare Science Program scientists have been tasked with answering.

Animal welfare is a holistic concept. Specifically, the zoo defines animal welfare as an animal's collective physical, mental, and emotional state over a period of time that is measured on a continuum from great to poor. If defining welfare wasn't challenging enough, measuring it has provided even more obstacles, namely because animals can't tell us how they're feeling. Katie Cronin, Ph.D., the zoo's senior animal welfare scientist and her team have been working within Animal Care to integrate the knowledge from the zoo's many years of caring and advocating for animals, and create an overarching program dedicated to making data-driven decisions to help inform how we care for species and promote positive welfare for every individual at the zoo.

"It's important to emphasize that the zoo is already a leader, promoting great welfare for the nearly 200 species here," says Cronin. "We believe in the work happening here, and we also believe that we can do more. The Animal Welfare Science Program was created to explore just that."

An interest in animal welfare is not new to the zoo—promoting positive welfare has been a goal for several years with research-driven habitat design and the innovation of ZooMonitor, a Lincoln Park Zoo-created behavioral monitoring app. What is new is the formalization of the Animal Welfare Science Program, which enables the zoo to regularly make decisions about how to care for animals based on information the animals themselves provide. Scientists work alongside curators and keepers to determine both the best way to ask the animals how they are doing, and how to interpret their responses to inform decisions about care.

In its simplest form, the welfare program has three steps: evaluate, enhance, repeat.

When boiled down to its simplest form the Program has three steps: evaluate, enhance, repeat. In addition to monitoring the welfare of individual animals around the clock, the program is designed to improve welfare by providing feedback —direct from the animals—about different care strategies and habitat modifications. Program scientists also understand each animal as an individual that may respond differently to the same stimuli.

"One of the most important things is that we are striving for continual improvement. This evaluate-and-enhance cycle is a critical component of how we do that," says Cronin. "Promoting great welfare is not an easy task. As an institution, we are trying to ensure each individual animal thrives. We are also developing new and objective ways to measure animal welfare given that it is multi-faceted and the field of zoo animal welfare science is young. It's a challenge—but a rewarding one." ▶

What's the difference between care and welfare?

Care is something provided to animals.

Welfare is what the individual animal is experiencing internally.

Photo by Julia Fuller

Photo by Todd Rosenberg

Theoretically, the Program sounds great, but how is it applied to the work happening at the zoo? Prior to the launch of Malott Family Penguin Encounters—a first of a kind experience for Lincoln Park Zoo—the Animal Care and Learning departments knew they wanted to evaluate the experience for both penguins and humans alike. The Animal Welfare Science Program set up a study using the ZooMonitor app to observe how the penguins' welfare was impacted by Encounters, and to inform any changes that would enhance welfare.

Scientists compared penguin behavior on days with and without Penguin Encounters to understand how offering this experience impacted the animals. They tracked which penguins participated as well as how the birds behaved during the experience. Overall, Penguin Encounters had a neutral or even positive effect on welfare—the penguins didn't show any behavioral signs of stress, and those who chose to participate spent more time playing, one indicator of good welfare. Using the heat map capabilities of ZooMonitor, scientists also concluded that the participating penguins were comfortable around the Encounter guests; the penguins used the space near the guests just as much as other areas. In fact, they often waddled right up to participants!

The study also revealed important individual differences between penguins. While some penguins were avid participants in Encounters, others chose to opt out and continue with their colony activities. The scientists are confident the ability for the penguins to choose whether or not to participate was likely key to the overall positive impact of the program on penguin welfare.

The set up at Lincoln Park Zoo has additional features that scientists hypothesize enhance welfare of the penguins, for example the penguins are not transported out of their habitats (the encounter space is built into the habitat at Robert and Mayari Pritzker Penguin Cove), and they aren't having any physical contact with the visitors.

"All of these choices were made intentionally by the zoo in advance based on available research and seem to have set the stage for great welfare," says Cronin. Moving forward, the zoo knows more about the individual differences in the penguins' interest and comfort that can be used to inform care and program design. The zoo can also use these findings to enhance future programming with other species.

"At first, the thought was to focus on the needs of the individual animals here at Lincoln Park Zoo and maybe a few years down the road conduct studies that would be helpful to other zoos and advance zoo welfare science more broadly," says Cronin. "But what has happened is the studies we're conducting, such as with Penguin Encounters, have been shared

Opposite page: *Pygmy hippo and Moholi bushaby.* ***This page:*** *Sichuan takin. All three of these species have benefitted from the Animal Welfare Science Program though data-informed habitat modifications such as belt feeders, adjusted light schedules, and shade structures.*

Photo by Brigid Gallagher

among other Association of Zoos and Aquariums-accredited institutions and has sparked interest in this new approach to encounters. We've even had other institutions come and visit Robert and Mayari Pritzker Penguin Cove to learn about what is working well here and use this information to inform their upcoming renovations."

The Penguin Encounter data from the Animal Welfare Science Program is currently being overlaid with research from the Learning department to understand how being in the same space as the penguins impacts learning outcomes and empathy for animals among human participants. The Encounters have been evaluated and the results will fuel the next steps, or the 'enhance' part of the cycle.

"The story is never over. We can always do more," says Cronin.

The evaluate-and-enhance cycle doesn't just apply to the research but also to the Program and its approach. While the Animal Welfare Science Program is set within the Animal Care department, its scientists work closely with nearly every team across the zoo to understand the big picture. The Program utilizes motion-triggered camera traps and acoustic monitors from the Urban Wildlife Institute, works with the Lester E. Fisher Center for the Study and Conservation of Apes on welfare assessment and evaluation tools, overlays behavioral data with hormone and stress levels gathered by the Davee Center for Epidemiology and Endocrinology, works closely with the Behavioral and Enrichment Husbandry manager to understand how enrichment impacts space use and, of course, entrusts ZooMonitor volunteers to collect data across zoo grounds daily. It takes a village!

With thousands of animals in the zoo's care, it will take time to best understand each individual's experiences, but that hasn't slowed down the Animal Welfare Science Program! Since its inception in early 2018, the team has already made significant improvements to animal welfare by working with other Animal Care staff around the zoo to create more natural light cycles for nocturnal animals at Regenstein Small Mammal-Reptile House, generate a new measurement for feather condition and establish welfare baselines for the chickens at Farm-in-the-Zoo, increase habitat usage and foraging of the pygmy hippos at Regenstein African Journey, track the impacts of cognition studies on troop aggression at Regenstein Macaque Forest, and provide shade structure recommendations for the takins at Camel & Zebra, among dozens of other projects.

"The story is never over. We can always do more," says Cronin.

Green tree pythons hatch yellow or red and don't turn green until around 6 months of age. Each scale can even be a different color!

Eclectic Company

BY JILLIAN BRAUN

How do you care for a venomous snake? Nocturnal mouse? Ancient crocodile? Curator Dan Boehm shares all the things you never knew about Regenstein Small Mammal-Reptile House.

Scaly, furry, slimy, fuzzy, tiny, gigantic. Two, four, six, or eight legs—or none at all! Small mammals, reptiles, and amphibians come in all shapes, sizes, textures, and colors. From itty-bitty cactus mice to hefty spectacled caimans, each species—and individual—at Regenstein Small Mammal-Reptile House has its own set of needs. Curator Dan Boehm and keeper staff care for all of them, a challenge requiring eclectic knowledge of animal physiology, natural history, habitat, diet, social and breeding behavior, and more. Here are a few aspects of care that make this space so unique.

Can't touch this

Several venomous species reside at Regenstein Small Mammal-Reptile House, including Rio Fuerte beaded lizards, Aruba Island rattlesnakes, and a white-blotched river stingray. Only specially trained staff care for these species—a multi-step process that only a few keepers have successfully completed.

"You have to have the right mindset to work with venomous animals. You have to be patient, calm, and calculated," says Boehm.

"It is all about being in mental control," adds keeper Michal Kisielinski.

Keepers also need to have a great deal of knowledge about animal behavior before working with these species to ensure the safest situation for everyone involved. Safety is the top priority. Venomous animals are enclosed by multiple barriers keepers must negotiate to access their habitats. Additionally, tools are always used to place food items in the habitat or to maintain the exhibit. Lastly, there's a plentiful stash of anti-venom on zoo grounds. The goal is to never have to use it.

They can do what?

"Amphibians and reptiles don't play by the rules. When people think of frogs, it's usually water-egg-tadpole-frog, says Boehm. "Solomon Island leaf frogs, however, skip that whole process. Eggs are laid on land and come out full frog. It's called direct development."

The axolotl—an aquatic salamander with feathery, external gills and a finned tail—is another great example. "They've adapted for the best chance of survival," says Kisielinski. In this case, that also means regenerating limbs and never evolving to a land species.

Various adaptations among the building's inhabitants means various needs. Each species can require a precise temperature range, water pH level, curated diet, humidity level, and specific plant life in their habitat—sometimes all at the same time, making caring for these species a scientific balancing act.

Which animal at Regenstein Small Mammal-Reptile House eats the least often? Most of the snakes eat a large meal once every two weeks.

From river beds to tree canopies

In the Ecosystem area, there is a multi-species Amazon River habitat with five species: white-blotched river stingray, yellow-spotted Amazon River turtle, Hoffman's two-toed sloth, white-faced saki monkey, and golden-headed lion tamarin. "Their differences in size, natural history, and diet help in managing them together," says Boehm.

The key to caring for multiple species is ensuring they all have choices and access to the items they need. The stingray and turtles don't compete for food because they have different dietary needs, so they can live harmoniously in the riverbed without much assistance.

The sloths, sakis, and tamarins are a bit trickier. Since sloths are nocturnal, they

Opposite page: *Green tree python.* ***This page:*** *Dwarf caiman are one of many unique species with individualized needs and care at Regenstein Small Mammal-Reptile House.*

Photo by Lisa Miller

Photo by Julia Fuller

eat after hours when the monkeys are in their behind-the-scenes spaces. To ensure the tamarins have a place to enjoy some privacy, a tamarin-sized nest box in the habitat is much too small for the larger sakis to investigate for snacks. These intentional habitat modifications help promote positive welfare for the animals and provide an idyllic habitat.

All-ages admission

The building was designed with multiple uses in mind, so the space can be nimble depending on animal needs.

"Regenstein Small Mammal-Reptile House is actually built with many habitats behind-the-scenes intended for breeding, aging animals, occasional wildlife-trafficking confiscations, head-start conservation programs, and the like," says Boehm.

Life expectancies for species that live a long time are also considered. Dwarf caiman, for example, endure for decades. Boehm, Kisielinski, and their team have to plan to care for species throughout their entire lives, which means planning habitat and space usage years—sometimes decades—in advance. This adds another layer of complexity to population and habitat planning.

What's the difference between poisonous and venomous? Venomous animals bite or sting. Poisonous animals release toxins after being bit or touched. Rattlesnakes are venomous while emperor newts are poisonous.

Stress relief

How do you know when a reptile or amphibian is stressed? It's not easy.

"The signs are less apparent in these species," says Boehm. "Appetite loss can be a major indicator of stress or illness in species, but since some reptilians eat so infrequently, our staff has to be in tune with other behavioral indicators."

Stress hormones can be measured in amphibian skin secretions (see "Skin Deep," page 14), but what are some visual clues to amphibian or reptile stress?

"Skin quality can be an indicator of health or stress in these species," says Boehm. "Meller's chameleons, for example, don't actually change color to match their environment. They change color when they are threatened. When they are stressed, they turn jet black."

Some signals of acute stress are more apparent, such as the rattle of an eastern massasauga rattlesnake. Chronic stress, however, is harder to detect. The care team pays close attention to subtle shifts in behavior, diet, and skin quality to ensure animals aren't experiencing increased levels of stress, which can make them more susceptible to illness.

Zzzzzzzzz

There are also several nocturnal species, including pygmy slow loris, lesser Madagascar hedgehog tenrec, and brush-tailed bettong to name a few. These creatures conduct their foraging and activity at night.

To help highlight some of these behaviors to curious daytime visitors the nocturnal species are managed on a "reverse light cycle." The care team worked with the Animal Welfare Science Program (see "Providing Opportunities to Thrive," page 8) to create a light cycle that mimics dusk and dawn with habitats being dark during the day, allowing patient visitors with keen vision to view nocturnal behaviors. This is also why guests of after-hour events, such as ZooLights or Adults Night Out, may see these animals snoozing in full "daylight."

Amphibious Alliance

BY CHRIS PULLAM

Lincoln Park Zoo is collaborating with conservationists to help Lake County frogs, toads, and salamanders leap forward with innovative science in restored habitats.

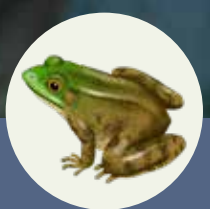
Amphibians Among Us

Meet the nine amphibians living in Lake County's oak woodlands.

ILLUSTRATIONS BY ASHLEY BEDORE

Blue-Spotted Salamander
3–5.5 inches long; greyish-black with blue flecks across its back; elongated body.

Tiger Salamander
6–8 inches long; greyish-black, with drab yellow-green blotches; large, lidded eyes; eats insects, worms, small mammals, and small frogs.



Green Frog
2–3.9 inches long; greenish-teal, but males have bright yellow throats; makes noise similar to plucked banjo string; eats insects, spiders, fish, crayfish, shrimp, other frogs, tadpoles, small snakes, and snails.

Lions. Elephants. Chimpanzees. African dogs. Mountain gorillas.

Rachel Santymire, Ph.D., director of Lincoln Park Zoo's Davee Center for Epidemiology and Endocrinology, has studied wild and captive species from every corner of the world via hair, blood, nail, semen, urine, and fecal samples. By analyzing the stress and reproductive hormones in biological materials, she monitored the pregnancy until the birth of a critically endangered eastern black rhinoceros at the zoo in 2013 and, since 1998, has supported the reintroduction of endangered black-footed ferrets in several Great Plains states.

But several local amphibians proved extra slippery.

In 2015, Santymire and a team of zoo scientists began studying the relationship between stress and chytrid fungus, a pathogen that has devastated amphibian populations worldwide, in Chicagoland. Testing for the fungus went by the books—after capturing individual amphibians, zoo scientists simply swabbed their stomachs and limbs, released them back into the wild, and then sent the samples to a lab for analysis.

Collecting the biological material necessary for stress analysis, on the other hand, required some innovation.

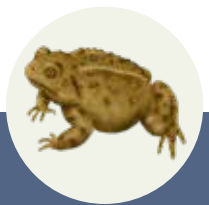
Initially, Santymire "expected to just find them in the water and pick them up. Then, when they peed on us, which is what my favorite amphibian, the toad, does to escape predators, we could collect their urine and analyze it."

In theory, "that would've worked perfectly," she adds. In reality, that did not happen, not even with the toads. Rather than resorting to more invasive techniques—like using a catheter to collect urine, taking blood samples, or waiting for days for them to defecate—she invented a completely new hormone-gathering technique.

"The largest organ in the body is actually the skin. It responds to hormones and even produces its own hormones," says Santymire. "So we decided to swab their skin, and, lo and behold, we got cortisol, the main stress hormone."

Photo by Allison Sacerdote-Velat

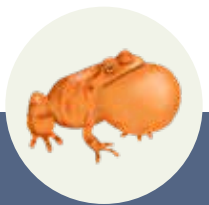
Bullfrog
3.6–6 inches long; olive-green above and white or yellow beneath; large eyes; eats rodents, small reptiles, amphibians, crayfish, birds, bats, and insects.



American Toad
2–3.5 inches long; varies from yellow to brown to black depending on habitat colors, humidity, stress, and temperature; makes high trill lasting 6–30 seconds; secretes mild poison, not dangerous to humans unless ingested, to discourage predators.

Northern Leopard Frog
4.3 inches long; primarily green or brown with dark spots; makes snore-like call; eats crickets, flies, worms, and smaller frogs.

Chorus Frog
1.6 inches long; smooth skinned; greenish-grey, reddish, olive, or brown; three dark-brown or grey stripes; cream-colored underside; very little webbing between toes.



Spring Peeper
1–1.5 inches long; tan or brown with dark cross on back; large toe pads for climbing; named because they start calling at the beginning of spring; present in the region, but some populations have become locally extinct.

Wood Frog
2–2.8 inches long; individuals can vary in color between brown or tan; dark eye mask; yellow or green belly; extirpated before being reintroduced in Lake County—but thriving in other parts of its range.

Photo by Rachel Santymire

Ecological Allies

The zoo's conservation partners in the restoration project include:

- Lake County Forest Preserve District
- Chicago Academy of Sciences/Peggy Notebaert Nature Museum
- Morton Arboretum
- Illinois Nature Preserves Commission
- Illinois Department of Natural Resources

Previous page: *Wild wood frogs.* ***This page:*** *Zoo scientists swab amphibians (like the blue-spotted salamander pictured here) to measure stress hormones and detect chytrid fungus. Afterward, the animals are released back into their protected woodlands.* ***Opposite Page:*** *Ashley Hosmer (left) and Allison Sacerdote-Velat (right) collect amphibians in a Lake County forest preserve.*

Thanks to her new technique, nicknamed "frog swabs," simultaneously checking amphibians for stress and chytrid fungus has never been easier. But the two analyses also share another critical relationship: Higher stress levels can suppress the immune system, leaving individual amphibians more susceptible to the deadly pathogen.

Out with the new, in with the old

In 2016, Santymire began applying frog swabs to a woodland restoration project in southern Lake County along the Des Plaines River—an area which had sites that tested positive for chytrid fungus.

Historically, the woodlands followed a natural pattern: Young trees aged. Wildfires burned. New saplings sprouted. Repeat.

The flames helped shape the plant composition of the woodlands, preventing less-fire-adapted trees from shading out oak seedlings and saplings in the understory. And once the fires burned out, the plants bloomed anew, followed closely by native animal species living in the untouched woodlands.

But as urbanization spread through northeastern Illinois, human management ended the natural phenomenon at the expense of individual species dependent on access to the landscape, which was disturbed by the construction of roads.

The Lake County Forest Preserve District has partnered with several local organizations to selectively reduce overhead canopy in important oak woodlands so more sunlight can reach the forest floor, decrease tree density so younger oak trees can establish, and remove invasive understory that out-compete native species.

For the past three years, Santymire and her colleagues have monitored the effects of those changes on seven native amphibian species already living in the region—blue-spotted salamander, tiger salamander, chorus frog, northern leopard frog, American toad, bullfrog, and green frog—as well as the wood frog and spring peeper, two species that were reintroduced to the woodlands as part of earlier wetland restoration research.

"Different amphibian species use the habitats in different ways," says Santymire. "Some are fully aquatic. Some lay eggs in the water. Some live in the water and then, through metamorphosis, move onto land. Because of the unique ways they

Photo by Rachel Santymire

interact with their environment, they can tell us about the landscape's health at different levels."

The restoration effort and wildlife study will continue for several more years, but the early results look promising. Amphibian richness, the number of unique species, has improved in most restoration sites, wood frogs have increased the number of breeding areas within the reintroduction site, and the other amphibian populations have adjusted accordingly.

Because of the unique ways amphibians interact with their environment, they can tell us about the landscape's health at different levels.

While chytrid fungus still lurks in the woods, the coalition hopes the project—namely, decreasing tree density by 60–80 percent and increasing canopy openness by 10–50 percent—will create an improved habitat for the amphibians, which will reduce amphibian stress in the area and increase the species' chances of overcoming the pathogen.

If that happens, it could provide a new model for countering the fungus around the globe.

Take Action With Us

BY MEGAN ROSS, PH.D.
ZOO DIRECTOR

Whether it's the smell of fresh rain, the sight of flowering trees, or the sound of calling frogs that excite you about spring's return, get out there and enjoy nature. Remember, though, to be respectful of wild places.

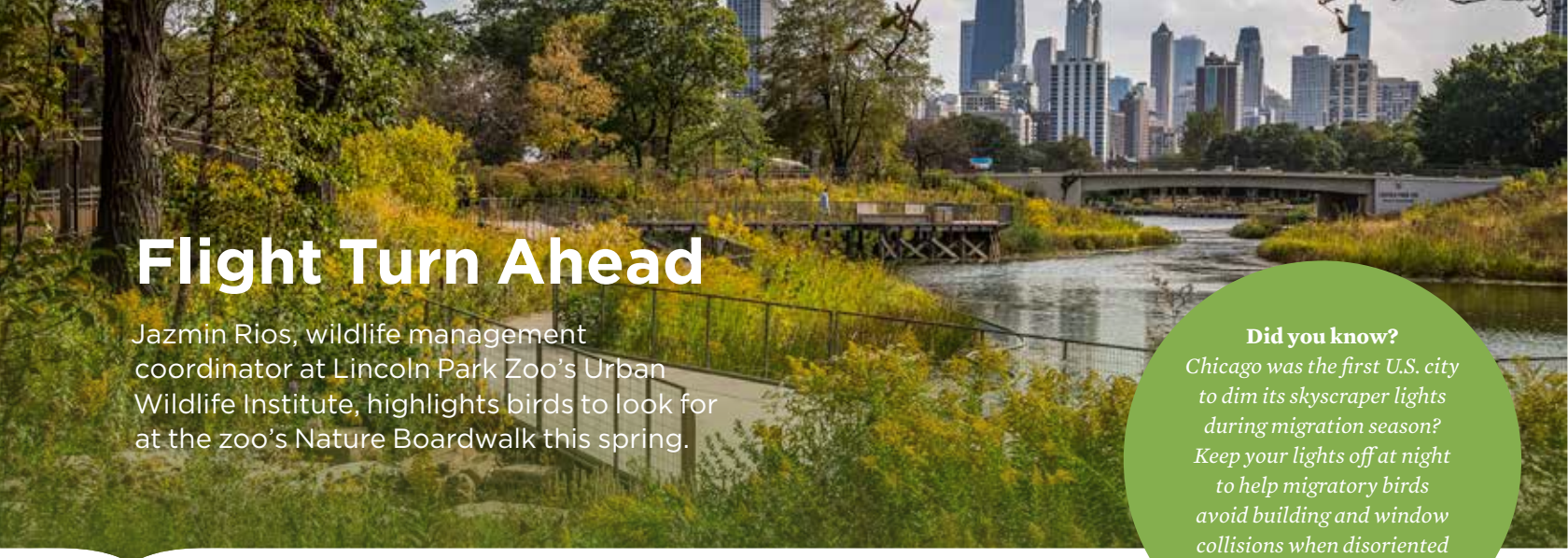
When out in the park with your family and pets, remember to stay on the path. Walking off established trails can damage vegetation and cause soil erosion. And don't forget the doggy-waste bags. Dog poop can attract unwanted wildlife. Plus, no one wants to step in that.

Maybe you like to go fishing or canoeing. If you're out enjoying time near a pond, lake, or stream, remember to keep your equipment clean. This can reduce the spread of harmful diseases—like the chytrid fungus here in Chicagoland—that are threatening many amphibian species. Cleaning your boots, waders, and equipment is easy and can help our wildlife thrive. First, scrape off any mud and organic matter from your footware before you leave a site. Then, in a container, dip or spray the item with 3 percent household bleach (one cup of non-concentrated household bleach to two gallons of water), let sit for at least five minutes, rinse with clean water and let it dry before the next use. Remember not to use the bleach near aquatic habitats as it is toxic to many organisms.

If you happen to see a frog, toad, or salamander, remember to admire it from a distance. Amphibians have sensitive skin they use to regulate water and salt intake and can even breathe through. Handling them, especially when you have applied bug spray or hand lotion, can be harmful.

But do appreciate the sights and sounds of nature. The presence of wildlife is an indication that our environment is thriving, so join us in protecting them.

Visit *lpzoo.org/magazine* for the downloadable amphibian field guide from pages 14–15.■



Flight Turn Ahead

Jazmin Rios, wildlife management coordinator at Lincoln Park Zoo's Urban Wildlife Institute, highlights birds to look for at the zoo's Nature Boardwalk this spring.

Did you know?
Chicago was the first U.S. city to dim its skyscraper lights during migration season? Keep your lights off at night to help migratory birds avoid building and window collisions when disoriented by bright artificial lights.

An incredible natural phenomenon occurs every spring in Chicago. In March, migratory birds begin to arrive from their southern homes, stopping by to rest and eat before continuing their journeys northward to summer roosts where they mate and breed.

Zoo scientists have seen nearly 200 bird species at Nature Boardwalk, the prairie-pond ecosystem south of the zoo's main grounds. During your next visit, keep an eye out for the species in their preferred habitats described below.

Caspian tern (March–June)

Often confused with gulls, Caspian terns have a vibrant red-orange bill, white and grey plumage, and a dark black cap on their head. To feed, they dive in the water and catch fish with their beak. They collect dried, dead vegetation and other debris to build their nests.

Did you know?
Urban Wildlife Institute researchers are investigating whether wearing a particular colored hat minimizes getting struck by a red-winged blackbird during their breeding season.

Red-winged blackbird (March–July)

Male red-winged blackbirds are often easy to spot, perched high in tall trees while singing to defend territory and attract females. True to their name, males have black-colored body feathers with red and yellow shoulder patches, or epaulets. Females have brown and grey feathered streaks and are often seen building nests in vegetation low to the ground. Sedges, like fox sedge, and native grasses provide prime habitat for this territorial species.

Black-crowned night heron (March–August)

Adults of this species have a black cap and back, white body, grey wings, and red eyes. Endangered in Illinois, night herons feast on fish in the pond at Nature Boardwalk, and young are often seen trying their luck at the Waterfowl Lagoon on the zoo's main grounds. These herons nest high in the branches of mature trees.

Spotted sandpiper (March–August)

This shorebird is often seen walking along the shoreline of Nature Boardwalk's Foreman Island looking for small fish, aquatic insects, and worms to eat. They use thick vegetation, such as raspberry plants and needles, to protect their nests.

Double-crested cormorant (March–October)

This dark feathered diving bird is often spotted feeding in Lake Michigan. It's occasionally seen at Nature Boardwalk perched on logs while gnawing on freshly caught fish. The yellow-orange facial skin and aquamarine eyes for the cormorant set it apart from other bird visitors.

Tree swallow (April–August)

One of four swallow species seen at Nature Boardwalk, the tree swallows luminescent blue-green and black flight feathers—contrasted with a bright white throat and belly—extend from an eye mask to their forked tail. They often gather along the boardwalk fence with rough-wing swallows and barn swallows. Although mainly insectivores, they will supplement their diet with berries from myrica shrubs such as bayberry.

Barn swallow (April–August)

With blue feathers on their back and a tawny chest, barn swallows spend their time eating insects and perched along the fence line. These agile fliers can also be found near puddles creating mud to build their cup-sized nests which can be found under the Lester E. Fisher Bridge.

Green heron (year-round)

This small heron has a deep green head and back with a brown chest. Like other heron species, green herons live near ponds, marshes, or other water sources. They can nest in pines, oaks, hickory, willows, box elder, cedar, and honey locust. Zoo scientists have seen them nesting on evergreens around the zoo.

Canada goose (year-round)

These large birds have a black head and neck with a white chest and broad, white cheek patches from the throat to the rear of the eye. They feed on grasses and aquatic plants, and can be seen swimming in the pond or nesting on Foreman Island.


Caspian tern


Spotted sandpiper


Green heron


Red-winged blackbird


Double-crested cormorant


Canada goose


Black-crowned night heron


Tree swallow


Cooper's hawk

Photo by Todd Rosenberg

Did you know?
Scientists at the zoo's Urban Wildlife Institute and Davee Center for Epidemiology and Endocrinology are collaborating to compare the health and stress of migratory and resident Canada geese.

Cooper's hawk (year-round)

One of the few wild birds of prey that visit the zoo this predator prefers open areas with large, mature trees. This stunning hawk has orange-red eyes, blue-tinted rounded wings, a brown-barred chest, and long tail.

Northern Cardinal (year-round)

Illinois' official state bird is one of the most common birds seen in Chicago, as well as several states to the east.


Barn swallow


Northern cardinal

Photos by Mason Fidino, Julia Fuller, Getty Images, iStock, and Shutterstock

The male cardinal—with bright red plumage and black mask and bib—often follows his less vibrant, reddish-olive female mate. Cardinals feed on berries and seeds.

Go Online for More Species

Visit *lpzoo.org/news* for blogs of various species including birds, amphibians, and butterflies, you may see at the zoo or in Chicagoland throughout the year!

Family Trees

BY BETH BOTTS
PHOTOS BY ELLEN NEELY

Tallying the zoo's trees chronicles the historic and current landscape and shapes plantings for the future.

Massive branches that arch overhead, bright flowers in spring, cooling green shade on a summer day: So much of the pleasure of a stroll through Lincoln Park Zoo comes from the majesty and grace of its trees.

Along a path, you may pass new saplings and grand old giants. Near the Helen Brach Primate House is one huge bur oak estimated to be 220 years old; the trunk is so wide that "it would take three people to hug it," says Joe Rothleutner, director of horticulture. The tree was already broad and shady when the zoo was founded 150 years ago.

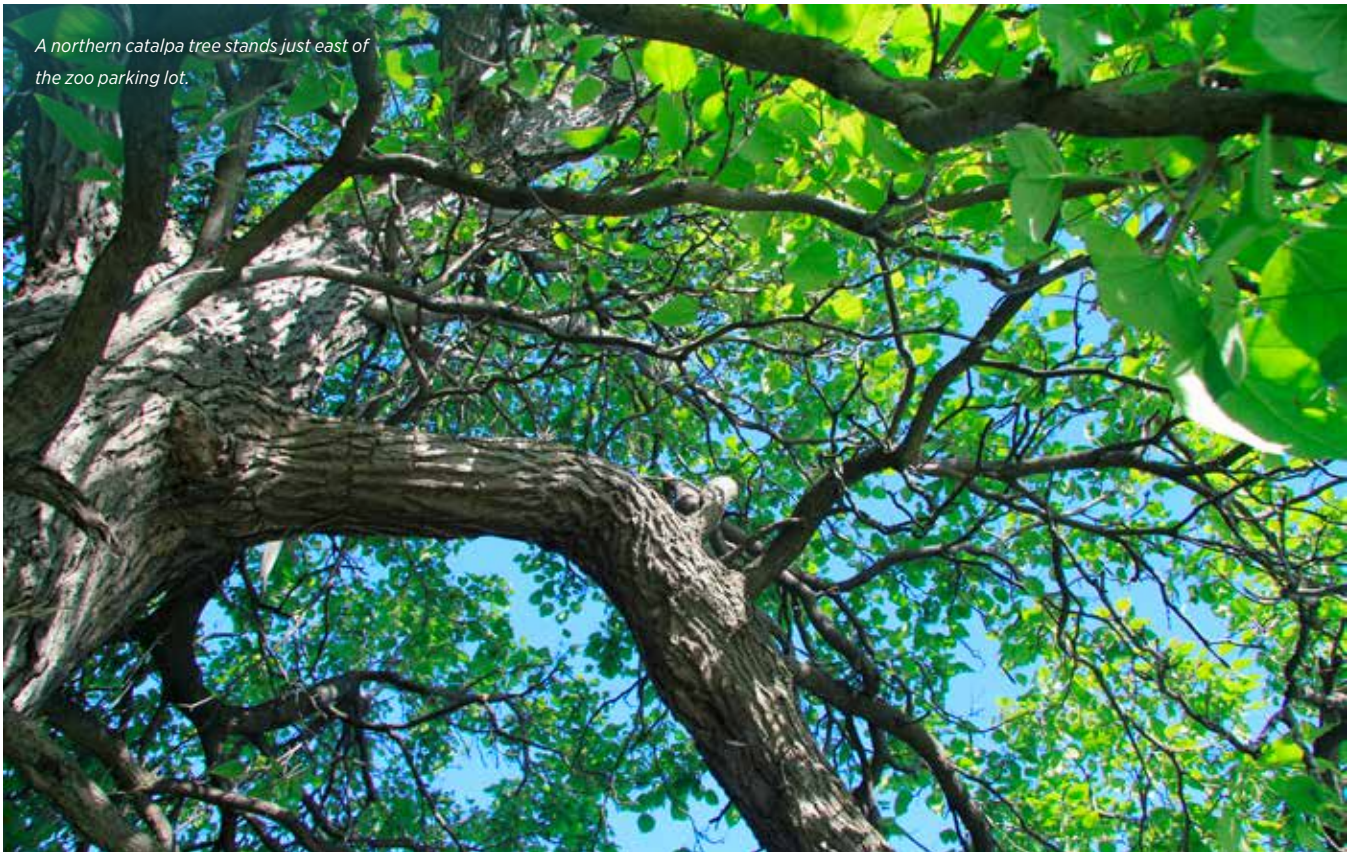
When this and other nearby oaks were young, they sprouted from acorns in dunes along the wild shoreline of Lake Michigan. By the time upstart Chicago decided it needed a park and a zoo, these trees were large enough to be valued features of the landscape. Around them, dunes became lawns, new animal noises filled the air, buildings rose, paths were paved, and hundreds more trees were planted.

The zoo now has about 1,500 trees of 300 types, according to a new tree inventory conducted by the horticulture staff. They include nine kinds of oaks, seven of them Chicago-area native species.

"We wanted to understand all the different kinds of trees we have and what we need to do for them," says Rothleutner. Reliable plant records only go back to 2009, so every tree from Nature Boardwalk to Walter Family Arctic Tundra had to be visited, identified, and measured.

Now there's a database where the lives and health of the trees can be monitored, in much the same way the zoo tracks its animals. "Some of these trees will still be living in 100 or 150 years," Rothleutner says. "And preventative care is important."

He and Abby Lorenz, manager of plant records and horticulture programs, are using the data to guide a greater investment in science-based care for existing trees and planting for the future. Preserving the zoo's historic trees requires extra measures, such



A northern catalpa tree stands just east of the zoo parking lot.

as pruning to remove dead or damaged limbs and fungicide treatments to hold off disease. “Medical bills tend to go up for all of us as we get older,” he says.

The inventory also helps them plan what trees to plant. No tree lives forever, and young trees must be added to continuously renew the tree canopy. But they need to be carefully chosen.

It’s critical not to plant too many of one kind, like the American elms that once lined parks and streets, easy prey for the Dutch elm disease that nearly annihilated them. To avoid that, the zoo plants many different species in the hope that no matter what challenges its trees face in the future, some will survive.

The historic oaks on the South Lawn have already seen the world’s climate change. Trees planted today will live to see even more changes—hotter summers, more drought, bigger storms, invasive insects, diseases, and new hazards. “It’s hard to anticipate what’s going to happen,” Rothleutner says. “Our only real safeguard is to plant a wide variety of trees.”

New plantings include not only native species but hardy trees from around the world, such as katsura, zelkova, and ginkgo trees from Asia. More flowering trees are being added to enrich the spring display (see “Spring Beauties”, right).

Where possible, Rothleutner and his staff choose trees that suggest the stories of nearby animals. No African tree could survive a Chicago winter, but near Regenstein African Journey there’s a tropical feeling in the huge leaves of an umbrella magnolia, a tree from the Appalachian Mountains.

Trees live long, and in a century, the umbrella magnolia may still stand while the zoo continues to grow and evolve. One thing is sure: With foresight and care for its trees, the zoo will still be green. ■

Spring Beauties

When you stroll Lincoln Park Zoo in springtime, you’re surrounded not only by gorillas, seals, and swans, but by the loveliness of flowering trees. Here are just a few of the blooming beauties you’ll find.

Eastern redbud: When pinkish-purple flowers appear on this small tree in late March or April, it’s a heart-stirring sight. Redbud is native to Illinois and the American Southeast. Its flowers, which bloom before the leaves open, provide pollen and nectar to insects early in the season.

Butterflies magnolia: The zoo has several varieties of hybrid magnolia, whose large, sculptural blooms open in late March or April. This variety is a cross between an Asian species and the cucumber tree, a magnolia native to the Appalachians.

Downy serviceberry: Native to woods in the eastern U.S. and the Chicago area, this species of serviceberry has white flowers in April or early May. It bears small, deep purple, bird-pleasing berries in early summer (hence its other name, juneberry). In fall, the leaves turn bright orange.

Prairifire flowering crabapple: In May, several kinds of flowering crabapple tree are cloaked in white or pink flowers at the zoo. This variety has deep pink blooms. In fall, the trees bear small apples that are too tart for people but are valuable food for birds and other wildlife.

Northern catalpa: Big clusters of bell-shaped white flowers, almost like orchids, appear in late May or early June on this large, handsome shade tree. In late summer, it has large brown pods full of seeds that hang like ornaments through the fall and winter.

Dan Boehm

Curator, Animal Care

How long have you been at Lincoln Park Zoo?
20 years!

What is it like to care for such a range of species?
I am constantly in awe at how much there is to learn, such as the unique nutritional requirements of an 8-gram dart frog or the behavior of a 2,000-pound Bactrian camel. No two days are the same. One moment I'm obsessing over water pH levels for an amphibian species; the next, I'm trying to engineer a light but sturdy scale that keepers can carry and takins won't break.

Have you seen these species in the wild?
My favorite "vacations" have been trudging through poison sumac-infested swamps and getting bit up by tropical disease-carrying mosquitoes. I've been to Panama to research fungal disease on frogs; across North America searching for Eastern massasauga rattlesnakes to study population dynamics; and to the Caribbean searching for Grenada tree boas to understand habitat usage on islands that are rapidly urbanizing. Field research is a small part of my job, but something I've been fortunate to pursue over the years.

Best memory at the zoo?
The "Snowpocalypse" of 2011! While most of the city shut down, zoo staff found creative ways to work through the ridiculous amount of drifting snow and care for every animal at the zoo. President and CEO Kevin Bell ran the grill at Park Place Café, making lunch for the exhausted staff. I'm proud to be part of the incredible team that worked together to get through that challenging day.
—Jillian Braun

Photo by Blaire Mynear

Tareah Sanders

Thirty-year zoo volunteer

Why did you begin volunteering at the zoo?
I started for the most common reason: I love animals. So I gave it a try, took the classes, and loved it. It really was the animals and all the people I met. We were all here for the same reason. I've met a whole lot of people, and we've all stuck together as long as we could.

You've volunteered here for 30 years. How have things changed?
In the beginning, we were giving talks and handling program animals. They ranged from armadillos to snakes to turtles and even birds. Now, [under a hands-off policy that supports their natural behaviors], we don't handle the animals. Mostly, we use educational carts to teach guests about animal hormones and climate change and the secrets keepers use to enrich the animals' lives, but the goal is the same.

Do you have any memorable experiences?
I will always remember [former Zoo Director] Dr. Lester Fisher chatting with the volunteers while walking around the zoo. Sometimes he would visit our office and personally give us information about the animals.

How long will you stay with the zoo?
The plan is to do it as long as I can. There comes a point in life where you just have to let go of some things. That doesn't mean you really want to, but sometimes you just have to. So I'll do it as long as I can, and if I can get to 45 years, that would be great. ▪
—Chris Pullam

Giraffe

Giraffa camelopardalis

Everyone knows giraffes have long necks, but they also have big hearts—literally.

To pump blood up to their brain, the world's tallest land animals require a powerful heart that weighs up to 24 pounds—heavier than some small dogs. Those long necks come in handy, though, while eating leaves on tall trees that other species can't reach.

They're also useful for swinging their heads at rivals like sledgehammers. Called "necking," this species-specific behavior is used to determine dominance among males, and can even break an opponent's bones.

But those aren't the species' only unique qualities.

This threatened species found in sub-Saharan Africa prefer open woodlands and savannas, and primarily eat the leaves of thorny trees, such as Acacia. To avoid thorns while enjoying their meals, giraffes have developed extremely long (up to 18 inches), manipulative tongues that can navigate tight spaces and pluck leaves from branches.

Finely, pictured here, and Etana live at the zoo's Regenstein African Journey. ■

—Chris Pullam

Photo by Chris Bljalba

LINCOLN PARK ZOO.
FOR WILDLIFE. FOR ALL.

2001 North Clark Street
Chicago, IL 60614
lpzoo.org

Your membership supports everything we do, from animal care to publishing Lincoln Park Zoo magazine.

Non-profit
Organization
U.S. Postage
PAID
Lincoln Park Zoo

RECYCLED
Paper made from recycled material
FSC® C003546

Our printing supports wind power
renewablechoice.com

By printing this issue on 100% post-consumer, recycled paper, we are saving:

42 trees

40,037 gallons of water

4,096 pounds of waste

13,458 pounds of CO2

Upcoming Events

Go to *lpzoo.org/calendar* for details on upcoming events.

March

Friday, 15
Teen summer program application deadline

Monday, 18–Wednesday, 20
Monday, 25–Wednesday, 27
Spring Break Camp (register for up to three days)

Wednesday, 20
LEAP: Spring Series begins

Friday, 29
Run for the Zoo price increase

Sunday, 31
Breakfast with the Animals: Small Mammals & Reptiles

April

Tuesday, 9 (members only)
Tuesday, 16 (general public)
Campout at the Zoo registration opens

Friday, 5
Malott Family Penguin Encounters resume

Monday, 15–Friday, 19
(register for up to five days)
Spring Break Camp

Saturday, 20
Easter Egg-stravaganza

Sunday, 21
Easter Brunch

May

Thursday, 2–September 30
Fitness at the Zoo

Saturday, 11
Members-Only Morning Food Truck Social

Sunday, 12
Mother's Day Brunch

Saturday, 18
Zoo-ologie *Hosted by the Auxiliary Board*

Wednesday, 29–September 26
Music at the Patio

June

Sunday, 2
Run for the Zoo

Monday, 10–August 23
Summer Camps

Saturdays, 8 & 22
Campout at the Zoo

Friday, 14 & Saturday, 15
Craft Brews at the Zoo

Sunday, 16
Father's Day BBQ

Thursday, 20
61st Annual Meeting of The Lincoln Park Zoological Society

Friday, 21
SuperZooPicnic