



**ANNUAL REPORT**  
Fiscal Year 2021



# ENGAGING PEOPLE WITH THE WONDER OF THE LIVING WORLD

The Zoo's mission is to engage people with the wonder of the living world through personal encounters that foster lifelong harmonious relationships with nature and to inspire and educate people to join with it in the active support and conservation of wild life and wild places.

Reflecting back on the Zoo's fiscal year 2021, it was a year of being nimble and responding to an ever-changing environment. It was a year of "what next?"

In the face of unpredictable COVID-19 trends, we committed ourselves to providing a safe and comfortable environment for visitors, staff, and volunteers while also protecting the health of the animals in our care. The Zoo was reopened to the public, but staff had to pivot almost daily in response to new protocols or government requirements. They did so remarkably well with a healthy dose of grace and humor.

Heading into the year, we drastically lowered attendance goals, fearing the worst. But we were pleased to find, by the end of the year, that we had exceeded our reduced expectations, with 395,293 visitors coming through the gate. While visits from school groups lagged for understandable reasons, our general attendance actually outperformed prior years.

Since travel to support our conservation partners was not viable during the year, we turned our focus to more local initiatives as well as bolstering our in-house sustainability programs. With the extra attention, we were able to make great strides in these areas.

Enthusiasm for new outdoor activities was so overwhelming that we launched events like Zoo Lights and Wine in the Wilderness. At the same time, we added more dates for the popular Twilight Family Strolls, Sip & Stroll happy hours, yoga, and Breakfast with the Animals. New animal experiences were developed to engage and educate guests, providing opportunities to toss fish to penguins, walk goats and feed tortoises, among other activities.

We appreciate beyond measure the very timely funding we received from the State of Maryland, the City of Baltimore, the citizens of Baltimore County, and the Howard County Arts Council and Howard County Government throughout Fiscal Year 2021. The federal PPP funds were an integral part of the Zoo's recovery as well. Foundations, donors, and the Board of Trustees also provided critical funding that helped us navigate a most unpredictable year.

We are excited for all that we were able to achieve this past year, and we look forward to future ways to advance the Zoo's mission. Thank you again for your continued support—we couldn't do all that we do without it!



Jennifer Lowry  
*Chair, Maryland Zoological  
Society Board of Trustees*

J. Kirby Fowler, Jr.  
*President & CEO*



**6 tons**  
of meat delivered to  
**animals**  
by commissary team



**995 examinations**  
by staff veterinarians  
on animals in the collection  
including **152**  
anesthetic  
procedures



**23,000 guests**  
attended Zoo Lights, raising  
**\$300,000**



**113 volunteers**  
gave over **8,500 hours**  
of directional support  
**149 volunteers**  
gave over **1,368 hours**  
of support for Zoo events



**1,400 vehicles**  
attended Brew Thru fundraiser  
earning the Zoo  
**\$95,000**



**342 virtual  
field trips**  
attended by **14,082**  
students & teachers



**395,293**  
visitors in FY21



**152 virtual  
Zoomobiles**  
serving **9,699** participants

**IMPACT FY21**



**3,248 tickets**  
for students and chaperones  
for in-person field trips



**177 animal wellness  
assessments**  
conducted by veterinary and  
animal care staff



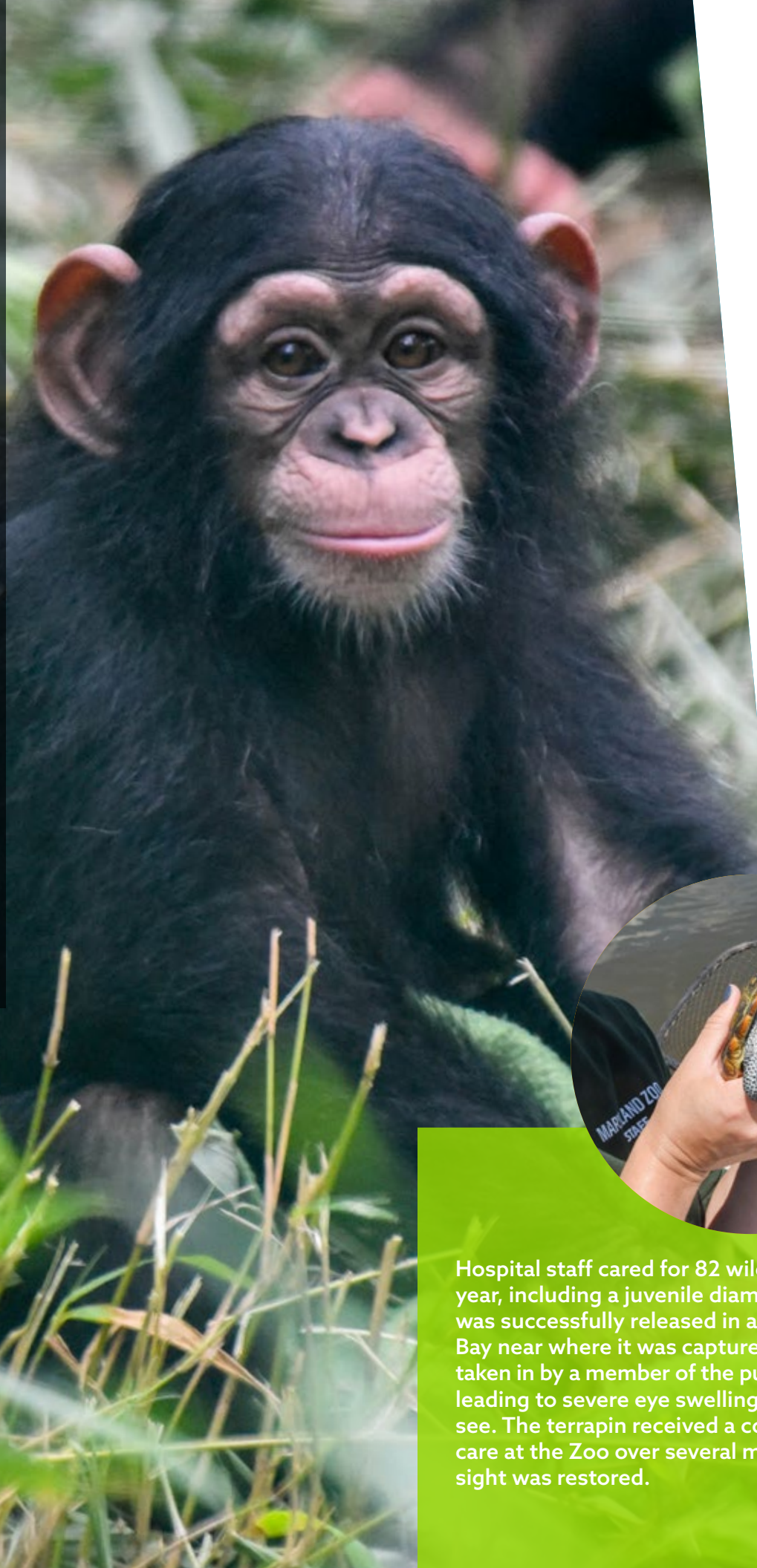
**13 tons**  
of fish delivered  
majority fed to **100**  
African penguins



**16 Sip & Strolls**  
hosted in fall 2020 & spring 2021  
raised **\$54,000**

## RAISING MAISIE

There is nothing routine about hand-rearing a baby chimpanzee or keeping watch over a sick animal or managing introductions between, say, rhinos and ostriches. Nonetheless, animal care teams at the Zoo routinely and willingly participate in intensive cases that require unwavering time and attention. They deliver extraordinary care whenever and however it is needed. This year, the Chimpanzee Forest Animal Care Team worked in shifts around the clock for approximately five months—or nearly 3,500 consecutive hours—to hand-rear “Maisie,” a newborn chimpanzee sent to the Maryland Zoo from the Oklahoma City Zoo in September 2020. When Maisie arrived, she was only one month old and needed to be held constantly and fed every three hours. Staff would groom her, play with her, and tend to her every need, just as a mother chimpanzee would. In time, as Maisie gained size and strength, staff oversaw her careful and complex integration into the Zoo’s chimpanzee troop. Maisie is now forging relationships with all adults in the troop and playing alongside Lola and Violet, her youngest companions.



## CARE

We put care front and center in everything we do and in every decision we make.

Fiscal Year 2021 began on an optimistic note. After 15 weeks of unprecedented closure due to the coronavirus pandemic, the Zoo re-opened to the public on June 27, 2020. Welcoming guests back to campus, reuniting staff, seeing our fabulous volunteers once more, and returning to somewhat normal operations inspired hope in all of us. But with that sense of hope came a strong sense of responsibility. To this day, the goal that remains top of mind is to keep visitors, volunteers, staff, and animals safe and healthy. In other words, putting care front and center in everything we do and in every decision we make.

The Zoo is uniquely positioned, no matter what, to care for its animals. We are guided by a special blend of passion, professionalism, planning, and protocols. We recognize that we have an obligation to provide animal care every day without fail, regardless of what is happening in the world, and our staff is well trained and wholly committed to that endeavor. As we often say, animals do not take weekends or holidays off—nor do they go dormant during a pandemic—so neither do we. This year has been all about creative pivoting! Our staff has managed impressively well, and the animals have continued to receive the best possible care in every respect.

We also have a culture at the Zoo of caring for each other. Perhaps it is because of a shared sense of mission or perhaps it is because “only at a zoo” experiences forge a strong bond. In any event, we are a tight-knit group, despite being spread across 135 acres and numerous departments. In the face of tremendous challenges created by the pandemic, our staff encouraged each other and found new ways to work together efficiently across departments to provide care, resources, programs, and events. We will benefit from our newfound experience going forward, and this can only make the Zoo stronger.

In late June 2020, we were thrilled to welcome visitors and many of our volunteers back to campus. We planned our re-opening carefully over many months, following local and state public health guidance and taking every necessary precaution to limit the spread of COVID-19. We have been operating at reduced visitor capacity, modifying our daily offerings, requiring timed entries, and encouraging online ticketing and cashless transactions. We have added custodial staff and intensified our cleaning protocols. We are doing all that we can to care for our guests while they are at the Zoo so that they can relax, enjoy, get outside, and visit with the animals.

Meanwhile, through this challenging and inspiring rollercoaster of a year, our broad and diverse community of members, guests, friends, and supporters has cared for us. When we invited the public to return to the Zoo, they did. When we asked our volunteers to step in and provide support, they did. When we requested much-needed financial assistance from our state and federal governments, we received it. When we needed encouragement, we got it in spades from our supporters and followers on social media. We cannot adequately express how much that support, care, and encouragement has meant to us, and how vital it has been to the Zoo’s ability to carry on.



Hospital staff cared for 82 wildlife patients throughout the year, including a juvenile diamond-backed terrapin that was successfully released in a tributary of the Chesapeake Bay near where it was captured. This animal was illegally taken in by a member of the public and fed inappropriately, leading to severe eye swelling and a resulting inability to see. The terrapin received a corrective diet and medical care at the Zoo over several months, and fortunately its sight was restored.



## ZOO TEENS

The Zoo's fiscal year usually coincides with the happy on-boarding of new teen volunteers, to join hundreds of adult volunteers helping in myriad ways behind the scenes and in public-facing roles at the Zoo. Needless to say, FY21 was anything but typical, but this did not stop our intrepid Zoo Teens! We brought on 60 new high school students, and they found ever more creative ways to engage with each other and to contribute meaningfully to the work and mission of the Zoo. While volunteering remotely, they led the Zoo's winning Plastic Free July competition and co-hosted virtual Teen Science Cafes with their counterparts at the Aquarium of the Pacific. Once able to gather in person, they worked in small, socially-distanced groups to manage the Zoo's vegetable garden, track wild box turtles, and participate in community engagement projects around Baltimore. We are proud of their work, inspired by their commitment, and grateful to The Kahlert Foundation for its generous support of the Zoo Teen program.

## ENGAGEMENT

We engaged with the public vibrantly, creatively, and without interruption.

### ENGAGING PEOPLE WITH THE WONDER OF THE LIVING WORLD

These are the words that frame our mission at the Maryland Zoo. Engagement is central to what we do, and engagement with the many communities that we serve continued vibrantly, creatively, and without interruption this past fiscal year.

Zoo educators are our chief ambassadors of engagement. They strive every year to offer a variety of programs to reach all segments of society: young and old, schools, scouts, libraries, businesses, families, and even adults out for a night of fun. This year, as the coronavirus pandemic continued to impact the way Americans learn, work, and play, our educators rethought their methods of engagement and revamped programs to meet people where they were. Our educators created Sofa Safari, a virtual summer camp for enthusiastic but housebound campers. They created virtual field trips and ZOOMobile programs to reach housebound students. They collaborated with colleagues in the Animal Department to present virtual "at home" zoo experiences such as Elephant Bath Time, Chimpanzee Rearing, and Rhino Training.

With the return of visitors to the Zoo, we also adapted the ways in which we engage people on campus, in part because of COVID-19 protocols but also in response to the popularity and appeal of small group offerings. Volunteers returned to service to offer directional support. Educators restructured hands-on

learning activities to engage visitors while maintaining social distance. Colleagues from the Education, Animal, and Visitor Services departments created new animal experiences—such as Penguin Fish Toss, Feed a Tortoise, and Goat Trek—that bring small groups of visitors closer to their favorite animals.

Meanwhile, staff from the Education and Conservation departments worked together to host Virtual Field Talks in partnership with Polar Bears International, Maryland Department of Natural Resources (DNR), Mabula Ground Hornbill Project, Southern African Foundation for the Conservation of Coastal Birds (SANCCOB), and the Okapi Conservation Project. Field partners participated from their homes all around the world, ranging from South Africa to the Eastern Shore. This pivot from our previously in-person Field Talks allowed us to engage a much broader audience at a time when everyone was yearning to hear about faraway places.

Last but not least, our Events team introduced new events and adapted old favorites to bring people to the Zoo for fun yet safe celebrations. During Brew Thru in July 2020—a twist on Brew at the Zoo—people toured the Zoo and saw penguins, giraffes, and elephants from the comfort and socially-distanced safety of their own vehicles. Brew Thru sold out both days, with 1,400 vehicles participating! Thousands more guests attended socially distanced events such as Wine in the Wilderness, Breakfast with the Animals, ZooBOOO, and the newly revived holiday favorite, Zoo Lights, which spanned six weeks, offered evening drive-thru and walk-thru options, and featured music, hot cocoa, and a half mile of sparkling animal-themed light sculptures.



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- 1. Wood turtle hatched at the Zoo
- 2. Two trumpeter swan cygnets hatched
- 3. Three clutches of Panamanian golden frogs hatched
- 4. Three-banded armadillo
- 5. Two red-tailed guenons
- 6. Two northern pinesnakes
- 7. Ten African white rhinos
- 8. Two great white pelicans
- 9. Slender-snouted crocodile
- 10. One blue duiker
- 11. Baby chimpanzee (Maisie) hand-reared
- 12. Baby chimpanzee (Maisie) hand-reared

# NEW TO THE ZOO

The Zoo's animal family grew spectacularly this year not just in number but in scutes, scales, skin, fur, feathers, and plates. We welcomed one of the world's tiniest antelope, two tremendous herbivores, a baby chimpanzee, and a pair of pelicans with nine-foot wingspans, among many others. Take a look at who was new to the Zoo, either by birth, hatching, or acquisition.



# CONSERVATION

We worked as hard as ever on behalf of wildlife.

In recent years, the Maryland Zoo has created a Conservation Department, formalized its conservation strategies, raised the profiles of its field partners, and advanced its most robust efforts to date in support of wildlife conservation near and far.

This past fiscal year, we worked as hard as ever on behalf of wildlife, but written work took temporary precedence over field work. Because of the restrictions imposed by the coronavirus pandemic, travel ground to a halt, and our ongoing wildlife conservation field projects around the state of Maryland and in South Africa, Panama, Bolivia, and elsewhere were suspended. Many staff who actively participate in field work changed gears and instead spent more time planning future work, writing grants, and completing manuscripts for publication.

Dr. Ellen Bronson, Senior Director of Animal Health, Conservation, and Research, completed and submitted a manuscript from her previous Bolivia field project on the anesthesia of maned wolves. Jen Sohl, Hospital and Conservation Programs Manager, worked on research proposals for a future project regarding the diagnostics of kidney disease in polar bears. Staff who were already deeply invested in AZA SAFE (Saving Animals From Extinction) projects continued their work from afar, most notably Jess Phillips, Area Manager of *Penguin Coast* and *Africa Barn*, with the African Penguin SAFE Disaster Response Project; and Pam Carter, Area Manager of *Chimpanzee Forest*, and Sharon Bowen, Education Manager, with the Chimpanzee SAFE Project.

Meanwhile, our conservation partners around the world were grappling with the pandemic and its fallout just as we were. They confronted significant challenges, not the least of which were lack of ecotourism support, sidelining of volunteers, and limited staffing even as animal needs continued unabated. With ingenuity and determination, they pursued their vital work to save and conserve species in the face of a global health crisis. We had pledged to provide them with financial support at this much-needed time and we kept that pledge.



As the year progressed with masking and social distancing, we also found ways to creatively continue local field work outdoors. Some highlights of that work included:

- Partnering with colleagues from Project SNOWstorm, one of the world's largest snowy owl research collaborations, to test the efficacy of a newly modified, matchbox-sized, solar-powered GPS transmitter designed to be worn backpack style by wild snowy owls
- Participating (staff and volunteers) in habitat clean-up at the Anita C. Leight Estuary Center in Otter Point Creek Natural Area in Harford County; Tree Baltimore tree giveaway in Druid Hill Park; and BLISS Meadows nature garden set-up in East Baltimore
- Continuing the decades-old Eastern box turtle survey project on Zoo grounds, with leadership from Kat Mantzouris, Hospital and Conservation Programs Coordinator, and enthusiastic participation from dozens of Zoo staff and Zoo Teens
- Sending staff to various bog turtle sites throughout Maryland in spring 2021 to support the Maryland Department of Natural Resources (DNR) with surveys and habitat restoration work



# SUSTAINABILITY

We made progress on sustainability practices.

Conservation and sustainability are two sides of the same coin. To conserve wildlife, you must protect and preserve the habitats in which organisms thrive and the ecosystems upon which they depend. To protect ecosystems, you must attend to the biggest one of all: this planet. Protecting a biologically friendly planet begins with practicing sustainability.

In a holistic nod to its conservation mission, the Maryland Zoo prioritizes sustainability in its operations model. We have learned over the years that sustainability is not something that happens overnight or with the push of a button. It results from incremental change. It requires a mindset of looking ahead and recognizing that choices we make today will affect the future health of our planet. Sustainability means using natural resources wisely, using energy efficiently, shifting to clean energy, minimizing waste and pollution, and promoting healthy ecosystems with strong biodiversity.

To these many ends, the Zoo continued to make progress this year, most notably in the following areas:



## Source food locally:

- The Commissary team expanded its local and in-house food-sourcing initiatives by breeding mealworms in-house for the first time. Mealworms are fed to many of the Zoo's reptiles, amphibians, smaller birds, and even some mammals. This in-house breeding program will save us money and reduce our carbon footprint by negating the need for cross-country shipping.
- The Commissary Team also continued to partner with BGE, the state's largest natural gas and electric utility, to receive branches trimmed from trees growing near power lines. The clippings are used as browse to feed to certain animals, including elephants and giraffes. This year, BGE bundled and delivered more browse than ever to the Zoo and, for the first time, also delivered a year's supply of winged sumac, the mainstay of our Coquerel's sifakas' very specialized diet. The donated browse is locally sourced and saves the Zoo thousands of dollars per week.



## Say no to plastic:

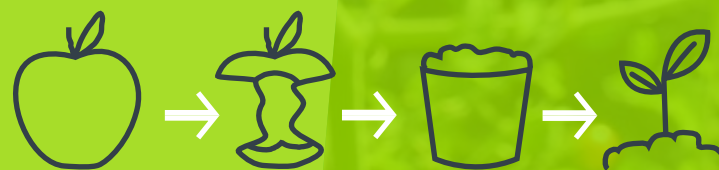
- In a continued effort to encourage reusables over disposable plastic, the Zoo installed two more water-bottle refill stations on grounds. Meanwhile, the Zoo's concession and retail partner, SSA Group, began removing single-use plastic from its daily operations. This included replacing plastic bottles with aluminum cans (which can be recycled more effectively than plastic) in vending machines.
- For the third year in a row, the Maryland Zoo team won the July Plastic Free Eco-Challenge, a month-long effort sponsored by the Coalition of North American Zoos and Aquariums to shift away from single-use plastic dependency and towards a plastic-free world. Zoo employees, friends, and families participated enthusiastically; Zoo Teens were great motivators; and we shared our efforts—and our victory—with the public through social media.



## Shift to clean energy:

- Six electric-vehicle charging stations were installed as a joint project between BGE, Baltimore City, and the Zoo in the parking lot area near Eagle Gate. This is the first BGE-installed charging location within the city, with many more to follow.

**1,200 LBS** of organic material  
**COMPOSTED** at the Zoo in FY21



**200 LBS** of composted soil  
**PRODUCED** for Zoo gardens

## THE ZOO'S VEGETABLE GARDEN

With vital and vigorous help from Eagle Scout Jeffrey McGowan from Troop 731, we were able to triple the size of our vegetable garden this year. We planted nine raised garden beds with lettuces, tomatoes, squash, beans, and pumpkins, all within view of the public walkway along Buffalo Yard Road. Zoo Teens worked in small, socially distanced groups throughout the summer to help maintain the garden and harvest the vegetables, which will be included in animal diets. We also added an active beehive to the garden area to boost pollination of the vegetable crops and native pollinator plants within garden walls. Composting efforts continued throughout the year in staff and animal areas, and the composted soil was placed on garden beds to grow better and more produce for the animals. Growing food in this and other gardens at the Zoo helps reduce our operating costs as well as our carbon footprint by scaling back truck deliveries to the Zoo.



## HISTORY

Notably, the Maryland Zoo has more historic buildings and ornamental structures on its grounds than any other zoo of its era. We are committed to maintaining them as part of our architectural legacy so that they too can tell a story and be enjoyed by future generations. This year, we partnered with Azola Building Rehab, Inc. and a number of local artisans to refurbish the Crise Fountain, one of three ornate public fountains on Zoo grounds that date to the 19th century. First, the fountain and its massive base were relocated from a hidden glen behind the scenes to a prominent spot near the Lakeside Pavilion. Next, artisans cleaned the marble and stone, repaired broken and chipped pieces, and created a new bronze lion's head and cast-iron railings. The work was guided by historic photos showing the fountain's striking decorative details. Now restored to its former glory, the fountain looks just as it did when presented to the City of Baltimore in 1870 by John L. Crise, Esq. We are grateful to those members of his family whose generous grants allowed us to revive this beautiful artifact of Baltimore history and put it on display for all to enjoy.



## RESILIENCE

We demonstrated resilience.

The Maryland Zoo was founded in 1876 and is the third oldest zoo in the country. It has been in continuous operation in Druid Hill Park, at the center of Baltimore City, for 145 years and counting. During that near century-and-a-half, the Zoo has faced its fair share of adversity and has always demonstrated resilience. Fiscal Year 2021 was no exception.

Without question, our greatest bout with adversity is still upon us. The coronavirus pandemic gripping the globe has challenged us—and the entire world—in ways that seemed unimaginable only a short while ago. Nonetheless, we have discovered silver linings this past fiscal year, etched by the resilience of our staff and the unwavering support of our community.

Even in the face of adversity, the Zoo continued this year—as it has throughout its history—to look to the future and focus on improvement.

In FY21, we improved several historically significant buildings on the Zoo's campus, including:

The Maryland Building



(before photo above)



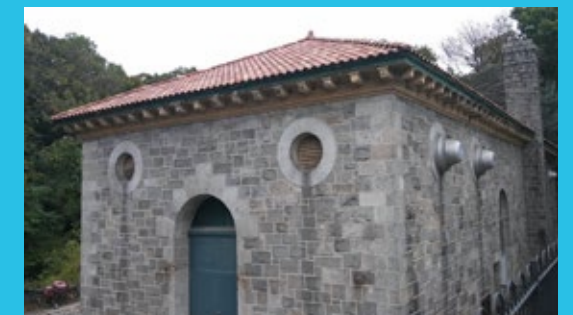
The Mansion House



(before photo above)



The Old Elephant House

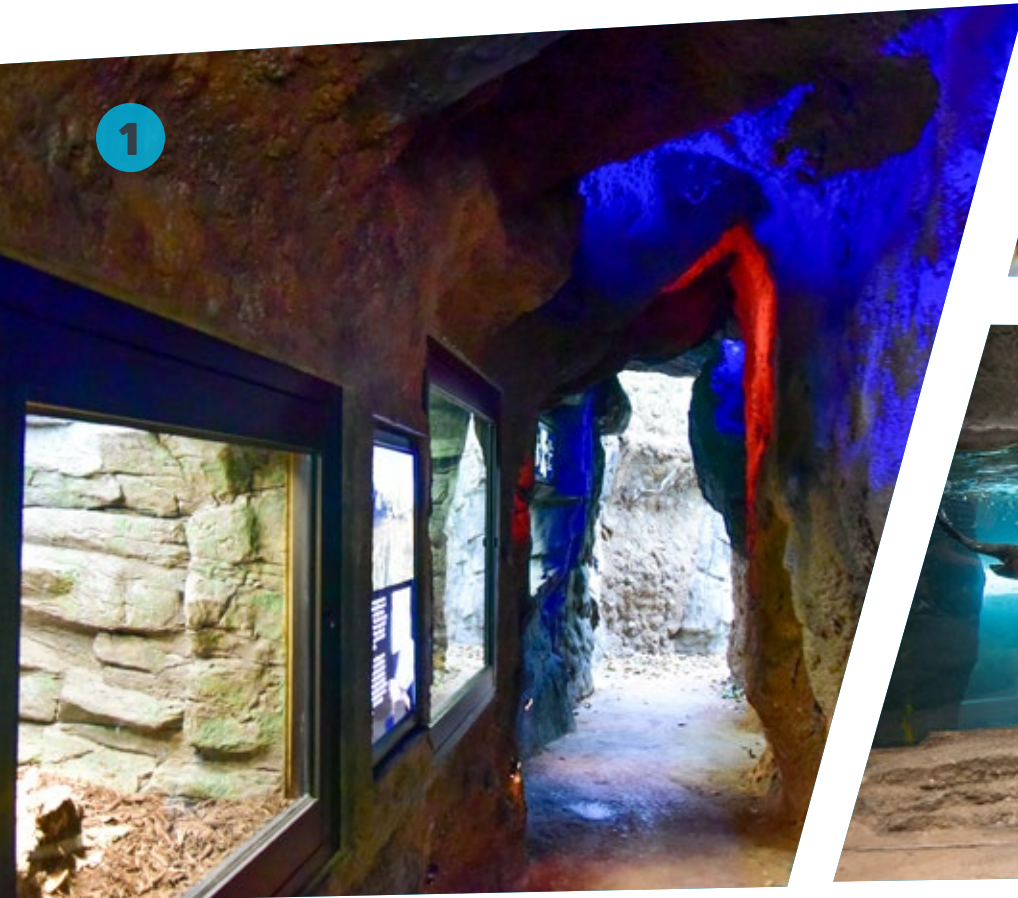


(before photo above)



In addition, we completed several major exhibit renovations, including:

1. The Giant Tree and Meadow exhibits in *Maryland Wilderness*
2. The West African Slender-Snouted Crocodile Habitat in Chimpanzee Forest
3. The Leopard Habitat in *African Journey*
4. The Otter Habitat in *Maryland Wilderness*
5. The Creature Encounters outdoor education center, now renamed the Naturalist Lodge



# FINANCIALS

Total Revenue: \$20,721,036

## SUPPORT AND REVENUE

### CONTRIBUTED INCOME

State of Maryland	\$5,821,796
Federal Government	3,380,857
City of Baltimore	1,608,429
County Grants	409,587
Foundation Grants	234,150
General Support	
<i>Annual Fund</i>	745,659
<i>Corporate</i>	432,000
<i>Other</i>	<u>328,601</u>
<b>Contributed Income</b>	<b><u>12,961,079</u></b>

### EARNED INCOME

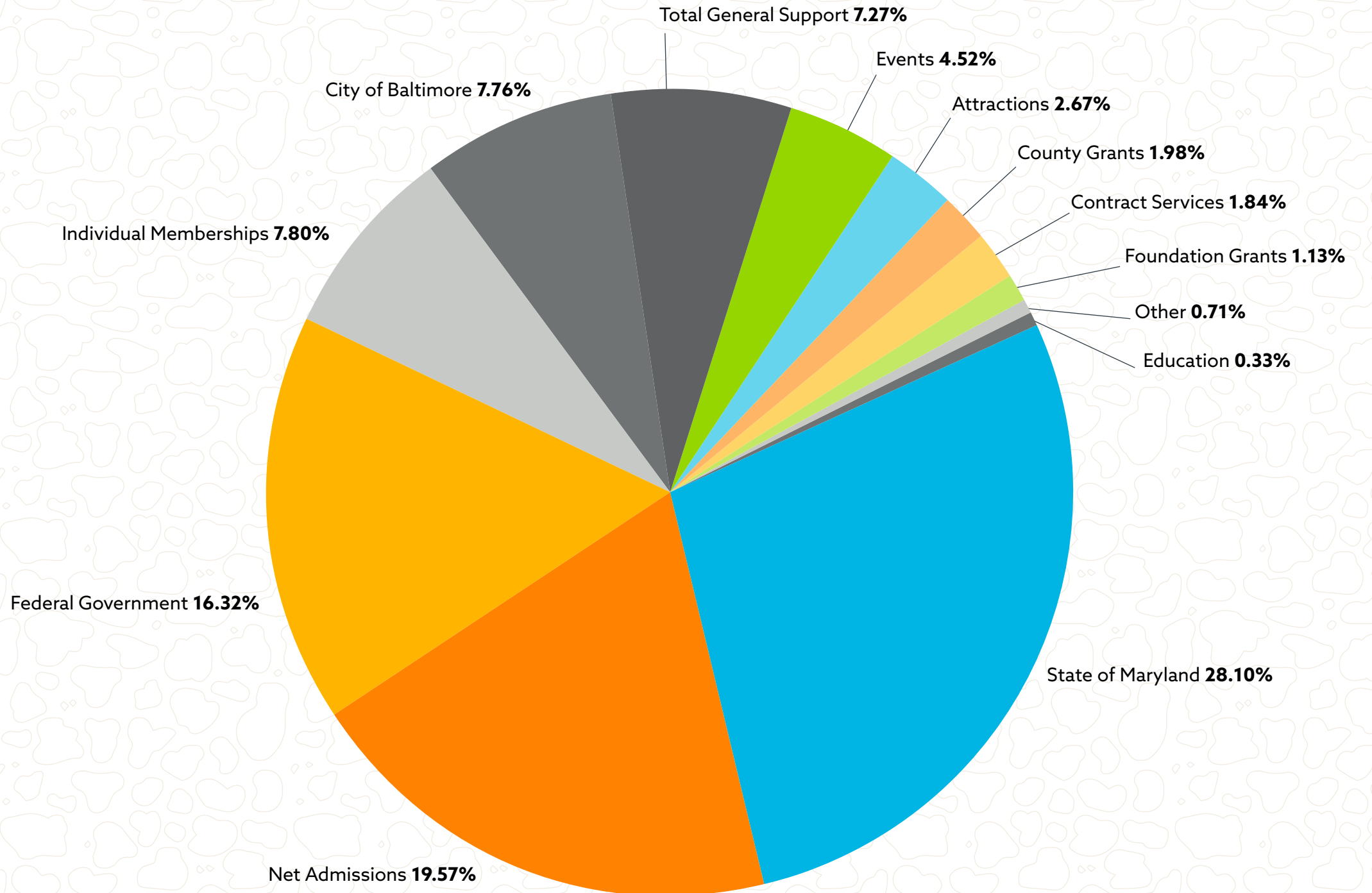
Net Admissions	\$4,056,049
Individual Memberships	1,616,880
Events	937,198
Attractions	552,575
Contract Services	381,667
Education	67,739
Other	<u>147,849</u>
<b>Earned Income</b>	<b><u>7,759,957</u></b>

**Operating Revenues**                    **\$20,721,036**

**Net Capital Support** (used to fund capital projects) **\$2,484,409**

## SUPPORT AND REVENUE CHART

Total Revenue = \$20,721,036



# FINANCIALS

Total Expenses: \$16,219,046

## EXPENSES

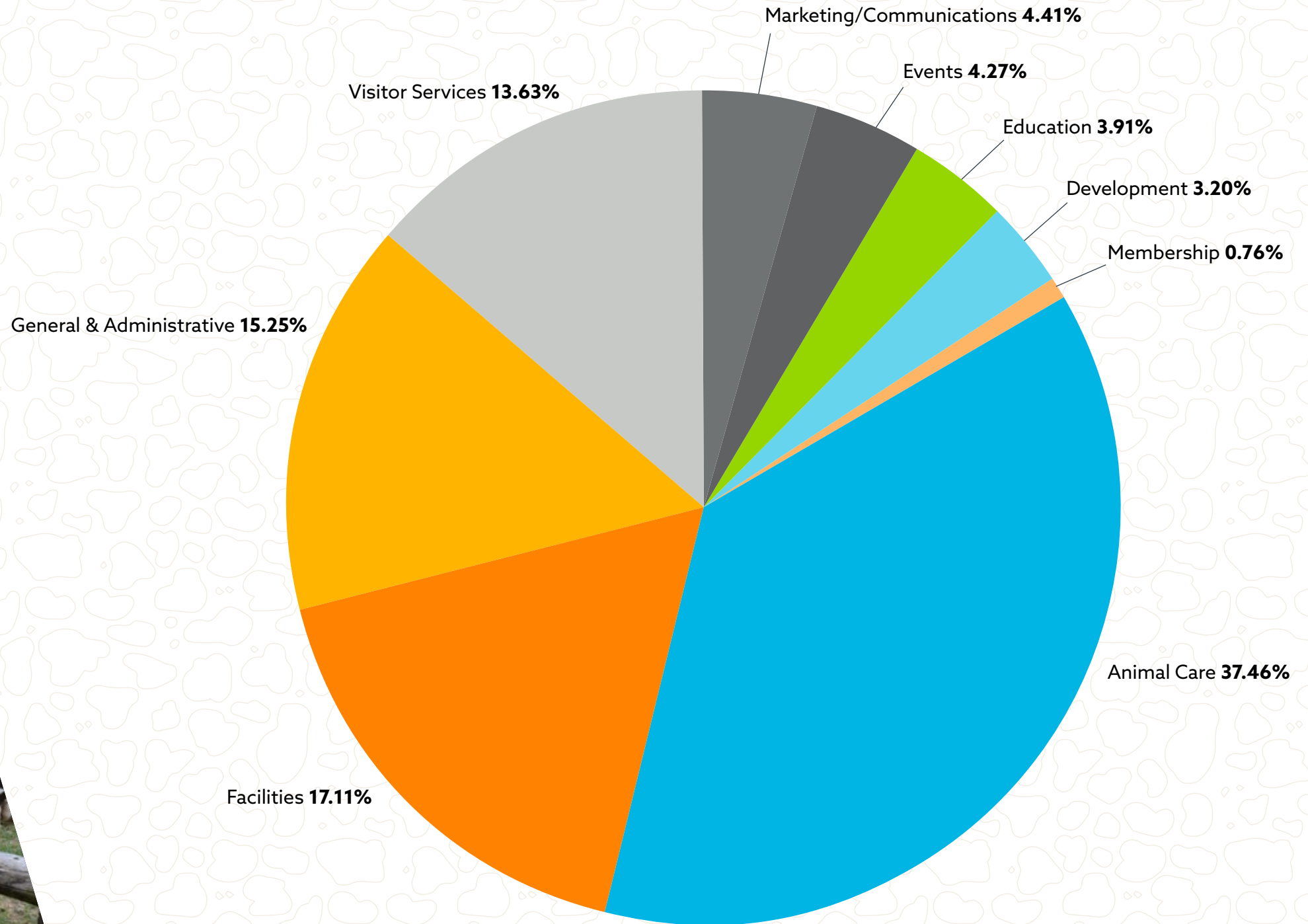
Animal Care	\$6,075,681
Facilities	2,775,656
General & Administrative	2,473,304
Visitor Services	2,210,540
Marketing/Communications	714,829
Events	692,181
Education	634,738
Development	518,510
Membership	<u>123,607</u>

**Operating Expenses Before Depreciation** **\$16,219,046**

Note: Depreciation 3,842,218

## EXPENSES CHART

Total Expenses = \$16,219,046





## RESEARCH & PUBLICATIONS

Scientific endeavors are essential to understanding and providing for the species in our care and to advancing wildlife conservation. Scientific knowledge that can be gained in a zoo setting is unique and important. The Zoo actively participates in acquiring and sharing knowledge through its many contributions to research studies, scientific literature, professional affiliations, and peer gatherings.

### RESEARCH

The Zoo is currently participating in several dozen ongoing research studies. The outcomes of these studies can have far-reaching consequences for the improved welfare and protection of zoo animals, their wild counterparts, ecosystems around the globe, and the people who live in them. Every study in which we participate is first approved by the Zoo's Research Committee, which is comprised of Zoo staff and outside researchers. The committee reviews proposals from staff as well as from outside researchers seeking to collaborate with the Zoo to ensure that proposed projects are safe, will not negatively impact the animals, can be performed in a timely manner, and have scientific merit. Select projects are described below.

#### SELECT RESEARCH PROJECTS: IN-HOUSE LED

##### **Determination of factors eliciting tetany syndrome in Panamanian golden frogs (*Atelopus zeteki*); Ellen Bronson, Kevin Barrett**

Tetany syndrome is commonly seen in Panamanian golden frogs and manifests as hind leg weakness and incoordination while hopping and swimming. It can lead to death and reduced fitness with unknown cause. This study will attempt to define the causes and factors of this syndrome by exposing groups of Panamanian golden frogs to different environments; the number and severity of tetany cases will be studied. This information will aid in the treatment and prevention of the syndrome, which will influence the fitness and success of the reassurance population of this critically endangered species. This joint project between the Hospital and Animal Departments began this year and will continue for two years.

##### **The effect of time span between tetany resolution and breeding on female Panamanian Golden Frog (*Atelopus zeteki*) reproductive success; Chris McIntosh**

This project examines the possible correlation between the time span of the nearest tetany syndrome resolution date to breeding date and reproductive success of female Panamanian golden frogs at the Maryland Zoo in Baltimore. Researchers will examine breeding and medical records of female frogs, with an aim to identify any potential effects tetany may have on reproductive success.

##### **Health surveillance of free-ranging raccoons (*Procyon lotor*) and red foxes (*Vulpes vulpes*) on the grounds of the Maryland Zoo; Ellen Bronson, John Flanders, Jen Sohl**

Since 1982, free-ranging raccoons and red foxes have been trapped, anesthetized, examined, blood collected, and to varying degrees vaccinated and vasectomies/tubal ligation performed. It is hypothesized that over time, disease incidence will decrease, the number of raccoons will stabilize, and the population per acre will decrease as the health of the species improves. In fiscal year 2021, 13 raccoons and one red fox were examined and released where captured.

#### SELECT SUPPORTED RESEARCH PROJECTS WITH COLLABORATORS

##### **The influence of weather & lateralization on flamingo resting; Dr. Matthew Anderson; Abraham Baldwin Agricultural College**

The Maryland Zoo live flamingo webcam was utilized for this pandemic-ready virtual research project to examine the influence of weather on Caribbean flamingo resting behavior and to study behavioral lateralization (side preferences). Previous work suggests that flamingos are more likely to stand on one leg on cooler days and when in water. This study was completed in early 2021 and the manuscript has been sent for review.

##### **Blood types of non-domestic felids; Drs. Lily Parkinson and Jennifer Hausmann**

This study has two primary aims: to demonstrate that point-of-care domestic cat blood-typing rapid test kits are suitable for use in non-domestic cats; and to define red blood cell storage parameters. Gene variants similar to domestic cats, as well as variants unique to non-domestic cats, will be identified. Results from this study may facilitate safer non-domestic cat blood transfusions and safer breeding of non-domestic cats. Fatal complications can develop in offspring of pairs with different blood types. Results from the study may also help trace non-domestic cat genetic lineages. Samples were submitted and blood typing results obtained for the Zoo's two cheetahs, female lion, and female leopard in 2021.

##### **Exploring how zoos are using Instagram to further their conservation efforts; Stephanie Rowan, University of Washington**

The purpose of this research study is to explore how and the extent to which zoos are using Instagram as a platform to further their conservation efforts. The study used a survey design to broadly assess how five zoos, including the Maryland Zoo, are promoting their conservation efforts and education through Instagram posts. Sinclair Boggs (Director of Marketing and Digital Media) worked with the researcher to complete the survey for MZiB in February 2021.

##### **Cognitive aging in chimpanzees (*Pan troglodytes*) living in managed care; Dr. Christina Cloutier Barbour, Lion Country Safari**

Chimpanzees are considered highly likely to experience many of the same neurodegenerative diseases as humans. This study aims to identify early markers of the development of dementia that may be common to both humans and chimpanzees with the goal of improving the care of aged (>35 yrs) great apes. Chimpanzee Forest staff completed surveys at the start and conclusion of the one-year study. The Zoo's large and dynamic chimpanzee troop allows for researchers to examine behavioral components in a quest to better understand our closest relative.

### **Genomic tools for the conservation of the African leopard; Ellie Armstrong, Stanford University**

The goal of this project is to complete a reference genome assembly for the African leopard. This will be used to understand the evolutionary history of the leopard and to develop tools for in situ conservation. Genetics is becoming an ever more popular means of estimating population sizes, tracking individuals, inferring relationships, and monitoring potential inbreeding. Reference genome assemblies also can be used to create portable tools to track illegally traded specimens and pinpoint their places of origin. Samples from the MZIB Biobank from our previous African leopard pair were utilized for this impactful study.

### **PUBLICATIONS**

**Bronson E**, Guy EL, Murphy KJ, **Barrett K**, Kouba AJ, Poole V, Kouba CK. Influence of oviposition-inducing hormone on spawning and mortality in the endangered Panamanian golden frog (*Atelopus zeteki*). BMC Zoology 2021;6:17.

Carag J, Sander S, **Kottyan J**, **Phillips J**, **Brubaker J**, Cruz-Espindola C, Boothe D, **Bronson E**. Pharmacokinetics of primaquine phosphate after a single dose administration to African penguins (*Spheniscus demersus*). J Zoo Wildl Med 2021;75-80.

**Mantzouris, K**. Everybody In! Tracking Eastern Box Turtles at the Maryland Zoo in Baltimore. Animal Keeper's Forum. 2020(47):7.

### **PRESENTATIONS**

**Jennifer Sohl & Kaitlin Ayrault**. The struggle was real: Managing a young male southern white rhino (*Ceratotherium simum simum*) with multiple health issues. Association of Zoo Veterinary Technicians Annual Conference. October 2020.

**Kaitlin Ayrault**. Enrichment and training of hospitalized patients: Short-term solutions for long-term health; Round table discussion. Association of Zoo Veterinary Technicians Annual Conference. October 2020.

**Jennifer Sohl**. Hospital Management Strategies; Working well with others; Round table discussion. Association of Zoo Veterinary Technicians Annual Conference. October 2020.

### **LECTURES**

**Dr. Ellen Bronson**: Zoo Medicine: Case challenges and career Q&A panel with veterinary students. University of Pennsylvania College of Veterinary Medicine. Virtual guest lecture. October 2020.

**Dr. Ellen Bronson**: The role of the Zoo Veterinarian. Mississippi State University. Undergraduate lecture for biological science students. Virtual guest lecture. October 2020.

**Dr. Ellen Bronson**: Diseases of captive and free-ranging mammals. University of Maryland College Park. Undergraduate lecture for biology and animal science majors. Virtual guest lecture. November 2020.

**Danielle Regan, Kevin Barrett, Dr. Ellen Bronson**: Panel on Panamanian golden frog research approaches. Notre Dame of Maryland University. Undergraduate animal behavior class. February 2021.

**Dr. Ellen Bronson**: Role of Zoos in Conservation. Towson University. Undergraduate herpetology class. March 2021.

**Dr. Ellen Bronson**: Comparative physiology of the gastrointestinal tract. Midwestern University College of Veterinary Medicine. Glendale, Arizona. Invited virtual guest lecturer for Veterinary Physiology course. May 2021.

### **PROFESSIONAL AFFILIATIONS AND ACHIEVEMENTS**

#### **IN FISCAL YEAR 2021:**

General Curator and Elephant Program Manager Mike McClure led the African Penguin AZA SAFE marine movement tracking program and continued to serve as a Member of the Board of Directors for the Elephant Managers' Association, Course Administrator and Instructor for the AZA Principles of Elephant Management 1 and 2, and Member and Scientific Program Chair for the Elephant Endotheliotropic Herpesvirus Advisory Group.

Dr. Ellen Bronson, Senior Director of Animal Health, Conservation & Research, served as veterinary advisor to the Felid Taxon Advisory Group, African Penguin Species Survival Plan and Taxon Advisory Group, Panamanian Golden Frog Species Survival Plan, and Project Golden Frog.

Mammal Collection Manager Erin Grimm was studbook keeper for the North American giraffe population.

Avian Collection Manager Jen Kottyan was re-elected to the African Penguin TAG (taxonomic advisory group) steering committee and co-published the African Penguin SSP breeding and transfer plans for 2019-2021.

Reptile & Amphibian Collection Manager Kevin Barrett was studbook keeper for the North American Panamanian Golden Frog population, published the Panamanian Golden Frog (Aho population) studbook, and co-published the breeding and transfer plans for 2021-2023. He and *Maryland Wilderness Area* Manager Danielle Regan also joined the North American Turtle AZA SAFE program as partners.

Regan also served as the SSP coordinator and studbook keeper for the North American Egyptian Tortoise population and published the Egyptian Tortoise studbook and SSP breeding and transfer plans for 2021-2023.

Chimpanzee Forest Area Manager Pam Carter served on the steering committees for the Chimpanzee SSP program and the Chimpanzee AZA SAFE program.

*Penguin Coast* and Africa Barn Area Manager Jess Phillips served as Vice Coordinator of the African Penguin AZA SAFE disaster response program.

Animal Embassy Area Manager Jenny Egan served as editor of the Tenrec Care Manual and the Animal Ambassador resource website (AARIC).

Vice President of Education, Interpretation, and Volunteer Programs Kerrie Kovaleski served as a member of the AZA Volunteer Management Committee.

Director of Education and Volunteer Operations Hannah Rupert served as a member of the AZA Diversity Committee and completed a Sign Language Certificate through The Hearing and Speech Agency of Metropolitan Baltimore.

Education Manager Sharon Bowen served as a member of the AZA Research and Technology Committee and its Technology Subcommittee and became an education advisor to the Chimpanzee SAFE Steering Committee.

Manager of Volunteer Programs Allison Schwartz served as President of the Maryland Council for Directors of Volunteer Services and completed a Sign Language Certificate through The Hearing and Speech Agency of Metropolitan Baltimore.

Staff Naturalist Peter Martin was one of the top 10 contributors to the Maryland Biodiversity Project on iNaturalist, monitored USGS Breeding Bird Survey routes and Important Bird Area routes, and served as a subject expert in several local nature surveys.

# CELEBRATION

We found much to celebrate.

Fiscal Year 2021 was challenging yet inspiring in many ways. The Zoo emerged from the year on better financial footing than expected. Our staff proved its ability to adapt, pivot, persevere, produce, engage, and provide care no matter what. Our volunteers, members, donors, supporters, and government officials stood by us. The animals, as always, gave us great reason day after day to be excited about what we do. The public did as well, sharing their enthusiasm for the Zoo virtually and in person all year long.

In the end, we have much to celebrate, including:

- Our staff
- Our volunteers
- Our conservation partners
- Our donors, supporters, and members
- the 395,293 people who visited the Zoo in FY21
- a return to in-person interactions
- our first ZooSnooze in more than a year, with 27 guests camping in the Main Valley
- the opening of Naturalist Lodge
- Sofiya the Amur leopard back in her lair
- Violet, Maisie, and Lola growing up together in Chimpanzee Forest
- Two new clutches of critically endangered Panamanian golden frogs
- 10 new African penguin chicks
- A host of new skills, programs, and events
- Hard-won professional experience, worth its figurative weight in gold

## COMMUNICATIONS

In a year that required physical separation for the sake of public health, we celebrated the chance to connect in other ways. Through social media and online communication, we brought the Zoo into people's homes while also expanding the breadth of our audience. Thanks to a generous grant from The John L. Leidy Foundation, Inc., we are broadening that online audience further. Our Communications team has been hard at work implementing changes to the Zoo's website that will make it ADA compliant by the end of 2021. For users with color blindness or limited vision, we have increased font size and altered display colors to improve contrast and readability. For users with hearing loss, we have included text overlay or closed captioning of all videos. For users with computer mouse mobility issues, we have increased the click area around buttons. We are gratified to know that these and other changes are making the Zoo's website more accessible to all.

### SPECIAL THANKS TO OUR BOARD OF TRUSTEES:

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## GOVERNMENT SUPPORT

BETWEEN JULY 1, 2020 AND JUNE 30, 2021

The Maryland Zoo continued to receive invaluable support from the State of Maryland, the City of Baltimore, the citizens of Baltimore County, and the Howard County Arts Council and Howard County Government. As was the case for many non-profit institutions in this past year during the height of the COVID-19 pandemic, the Zoo received critical funding from the United States Government. Together, these governments provided more than half of the Zoo's operating budget. The State of Maryland remained the most significant funder of important capital improvements. We remain deeply grateful for government leaders' recognition and appreciation of the Zoo as a high-quality institution serving the community.



THE CITIZENS OF  
BALTIMORE COUNTY



Howard County Arts Council through a grant from Howard County Government

## ZOO VOLUNTEERS

The Zoo benefits tremendously from the time and talents of its many volunteers of all ages. This dedicated corps provides hours of valuable service that enhance Zoo operations at every level and add positively to the guest experience.

### Over 600 Hours

Bob Lidston

### 500-599 Hours

Cindy Bowie

### 400-499 Hours

John Shaffer

### 300-399 Hours

Maryellen Reek

Peggy Sullivan

### 200-299 Hours

Beth Bishop

Suzanne Blair

Precious Conteh

Joseph Escobedo

Arlene Falke

Herbert Goldman

Jeffrey Griffin

Darian Hauf

Lynn Krufft

Nancy Phillips

Lyn Reeves

Ethan Reilly

Jack Sheehe

### 100-199 Hours

Sarah Arjoon

William Brandenburg

Susan Browning

Diane Burkom

Judith Castro

Noah Diaz-Portalatin

John Eybs

Gerald Galuardi

Judi Guralnick

Betty Harris

Joshua Herren

Kathryn Hogue

Carol Jones

Sandra Krauer

Susan Landers

Tom Levickas

Glenn Lichtman

James Lurz

Gail Mahan

Nicole Mastroluca

Ted Miller

Kathleen Monroe

Anakin Moyle

Meredith Nishiura

Barbara Pilert

Edward Shevitz

Brije Smith

Samuel Tucker

Bridget Walker

Laura Webb

### 50-99 Hours

Victoria Allman

Lark Anderson

Randy Ash

Dacia Balch

Elaine Bowen

Summer Brown

Lynne Burek

Julia Dimaio

Jim Dobson

Sean Fitzpatrick

Poulheria Frankos

Gabriel Fuqua

Olivia Ghiar

Jillian Haudenshield

Linda Hayes

Bernard Hayes

Margaret Kato

Alan Katz

Helen Kiefert

Eileen Kuhl

Jeanne Lambdin

Larry Martin

Hilde Martin

Nancy Meier

Michael Moore

Di'jae Mosby

Frances Murphy

Tom Nasuta

Arlene Ogurick

Eris Owens

Jessica Paffenbarger

Ellon Ruschell

Sara Service

Rhona Sober

Hiedi Sturm

Kathy Thomas

David Wallace

Katie Weaver

Susan Wentz

Iris Zheng

### Up to 49 Hours

Annette Abramson

Keon Adams

Faridatou Adedoyin

Michelle Althouse

Brittany Astor

Ivana Awuah

Marylee Barnes

Crystal Barrett

Ceane Batten

Will Benner

Blanca Berger Sollod

Sanjana Bharadwaj

Deanna Blake

Nora Bodkin

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The Maryland Zoo in Baltimore is a non-profit organization accredited by the Association of Zoos and Aquariums.



The Maryland Zoo in Baltimore  
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Druid Hill Park  
Baltimore, MD 21217-4474

## HOURS OF OPERATION

Administrative offices are open Monday through Friday, 8:30 a.m. to 4:30 p.m. The Zoo is open to the public from 10 a.m. to 4 p.m., daily during the months of March through December, and Friday through Monday during the months of January and February. The Zoo is closed Thanksgiving Day and Christmas Day.

When planning your next visit, please check the Zoo's website—[www.MarylandZoo.org](http://www.MarylandZoo.org)—for timely updates on events, programs, exhibits, and improvements. Follow the tabs on the website to reach any Zoo department, including Group Sales, Membership, and Education.

