



ANNUAL REPORT

FY 2020–2021

Museum and Friends of the Museum

NORTH CAROLINA *Museum of Natural Sciences*



NORTH
CAROLINA

**Museum
of Natural
Sciences**

MORE INFORMATION

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State of North Carolina, Roy Cooper, Governor;
Department of Natural and Cultural Resources,
D. Reid Wilson, Secretary

ANNUAL REPORT

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North Carolina Museum of Natural Sciences





WELCOME

The North Carolina Department of Natural and Cultural

Resources takes care of the things and places that people love about our state, literally from A to Z (Art museums to the Zoo), including the North Carolina Museum of Natural Sciences. We are unique in offering highly regarded museums that are state facilities — the property of the people. This Museum has consistently been the most-visited museum and one of the top attractions in the state. In addition to providing engaging experiences for visitors, the Museum is also highly regarded for its extensive science education programs and for the cutting-edge research conducted by its scientists. I truly appreciate the staff's and volunteers' tireless work, dedication, smarts, and love for science. Their efforts will contribute to greater scientific literacy and understanding, an essential component of North Carolina's future success.

D. Reid Wilson

Secretary

NC Department of Natural and Cultural Resources



INTRODUCTION

It gives me great pleasure to present our Annual Report for the North Carolina Museum of Natural Sciences, for the Fiscal Year 2020–2021. The format of this report is based on our 2021–2023 Strategic Plan, created between January and June 2020.

The Fiscal Year 2020–2021 was a period filled with more challenges and opportunities than most. In July 2020 the pandemic meant that the Museum was still closed to the public, as were most North Carolina Government facilities. We were tested in ways we had never been before. We responded by seeking out new methods of reaching participants digitally and, in doing so, engaged new audiences. We delivered more than 350 digital programs to nearly 11,000 students across the state and hosted hundreds of other virtual programs, reaching an additional 50,000 people.

The 100 Counties Project was a major step forward in our mandate to serve the people of North Carolina. This initiative has helped us understand where our offer is being taken up, where it is needed, and where to appropriate resources. It also allows us to celebrate with our stakeholders our commitment to engage with all of our state's counties on an annual basis.

The Museum's researchers continued their important work, including starting the year off with a newly described species, a 237-million-year-old relative of both dinosaurs and pterosaurs from Madagascar. The fossil reptile, named *Kongonaphon kely*, or “tiny bug slayer,” would have stood just 4 inches tall. Our scientists

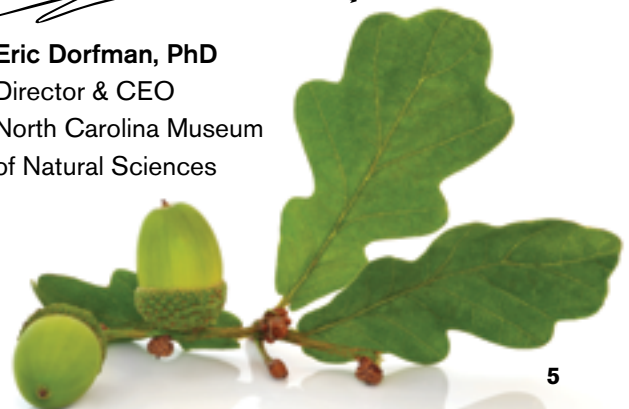
also discovered a new species of amphibian, the vibrant crimson-hued Carolina Sandhills Salamander, *Eurycea arenicola*.

In late September we reopened to the public. By November we were ready to announce the acquisition of the Dueling Dinosaurs — a magnificent pair of the world's best-loved species, *Tyrannosaurus rex* and *Triceratops horridus* — gifted to the Museum by the Friends of the NC Museum of Natural Sciences. We announced the addition of two new branch locations in Grifton and Greenville (Pitt County), greatly improving our ability to reach community members in eastern North Carolina. Before the year was out, we also began the recontextualization of *RACE: Are We So Different?* — an award-winning exhibit the Museum had recently acquired.

Sincerest thanks go to the many staff members who had the strength to achieve a remarkable amount under such challenging circumstances, meeting those uncertain times with patience and good humor. I also want to recognize the members of our community for the friendship and support they extended over the last year. It is truly a solid foundation on which to build.



Eric Dorfman, PhD
Director & CEO
North Carolina Museum
of Natural Sciences





VISION & MISSION

Mission: To illuminate the natural world
and inspire its conservation.

Vision: A knowledgeable and empowered society,
making decisions informed by science.







RELEVANT & INFLUENTIAL

Dueling Dinosaurs

In November 2020, the Friends of the NC Museum of Natural Sciences announced the acquisition of the Dueling Dinosaurs. These two fossils, a *Tyrannosaurus rex* and a *Triceratops horridus*, were buried together at the time of their death, 67 million years ago. They are special because of the mystery surrounding their death, as well as the unique completeness of the specimens, which were preserved 100% intact. Museum Head of Paleontology, Dr. Lindsay Zanno, and her team will be able to uncover unprecedented information about these iconic dinosaurs and provide the information to the public via a state-of-the-art exhibit space, which is due to open in Spring 2023. The initiative is predicted to bring in more than \$100M to the local economy. [FOLLOWING PAGE]

Worldwide Research

Museum researchers had numerous studies published in peer-reviewed journals, highlighting projects performed around the globe: from North Carolina and the American West, to Europe, Africa, South America and southeast Asia. The studies ranged in time from present-day status checks of endangered species to paleontological studies of protomammals that roamed the Earth

more than 300 million years ago, and even to meteorites, which date to the origin of the solar system (around 4.6 billion years ago). Museum researchers also tackled Pandemic-related research. Museum mammalogist Dr. Roland Kays began studying the Anthropause — the reduction in human activity during the pandemic — and how this affects wildlife. And Museum genomicist Dr. Julie Horvath studied the risk COVID-19 posed to lemurs and lorises. [FOLLOWING PAGE]

[PREVIOUS PAGE] Already possessing more salamander species than any other state in the country with 63, North Carolina has added one more to make it 64. In a December 2020 publication from Museum herpetologists Dr. Bryan Stuart, Jeff Beane and Alvin Braswell, the aptly named Carolina Sandhills Salamander (*Eurycea arenicola*) was introduced to the world.

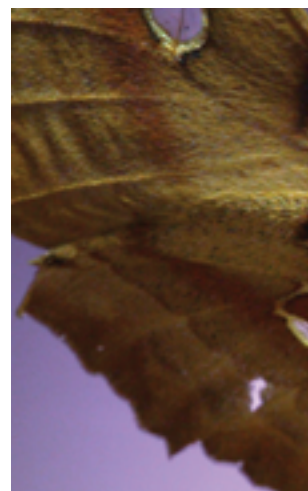
[FOLLOWING PAGE] Ant Lab is the YouTube channel of Dr. Adrian Smith, Head of the Evolutionary Biology & Behavior Research Lab. The site is equal parts research and public engagement and provides fresh insights into the mechanics and evolution of insects via outstanding up-close slow-motion videos that have received almost 3.2 million views. Smith and his videos are also regularly featured on PBS NC's "Sci NC" program.



4
MILLION
SPECIMENS

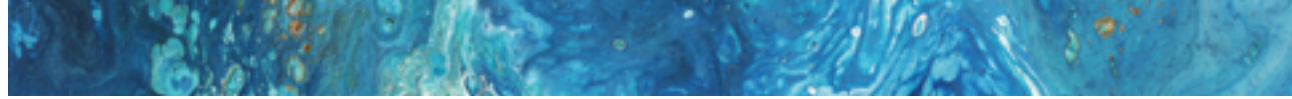
82
PEER-REVIEWED
ARTICLES

4,500
TIMES CITED









PRIORITIZING PEOPLE

RACE: Are We So Different?

In 2017, with the help of community partners alongside the NC Department of Natural and Cultural Resources, the Museum purchased one of two copies of the blockbuster touring exhibition “RACE: Are We So Different?”, which was created by the Minnesota Museum of Science. The Museum has reengaged Dr. Yolanda Moses, the exhibit’s original curator based at the University of California, to assist in reinventing the exhibition for North Carolina and the southern experience. As the main exhibition is being redeveloped, in addition to laying the groundwork for significant fundraising for the exhibition, we are also putting together a series of pop-up exhibitions designed specifically for small venues. These panels will incorporate the genius of local fine artists and be connected to live programming and digital content through QR codes.

[PREVIOUS PAGE]

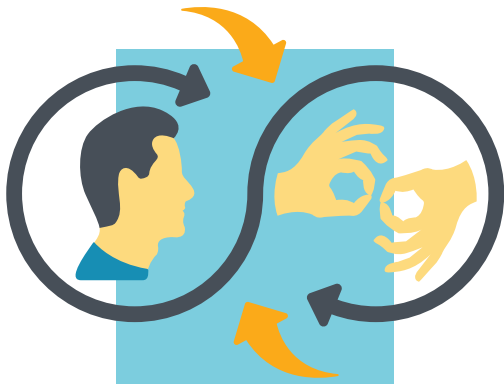
100 Counties Project

To celebrate the Museum’s involvement across North Carolina, and to help in future planning, the Museum has created the “100 Counties Project,” an interactive map that provides data on the ways we serve each county in North Carolina. People

interested in our impact on any part of North Carolina can click on a county and see the kind of work we are doing in each locale. This information gives us a baseline to ensure we spread our effort as evenly as possible across the state, focusing on areas of greatest need. Utilizing this exciting new tool, NCMNS was able to illustrate how we serve all 100 counties in FY 2021.

[FOLLOWING PAGE]

[FOLLOWING PAGE] Over the course of the past year, the NCMNS team has been able to offer over 200 hours of live captioning and 40 hours of ASL interpretation for a range of programming from large events like BugFest and Astronomy Days to the STEM Career Showcase for Students with Disabilities and recurring programs such as Natural Science Classrooms and Accessible Dinosaur Tours.



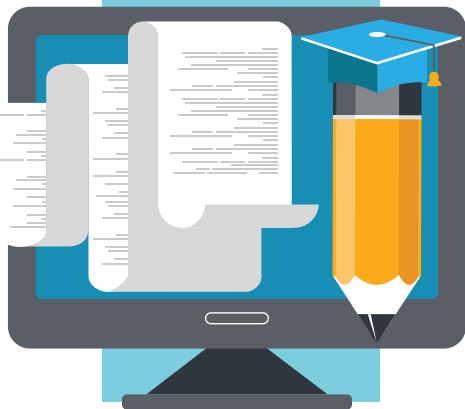
240

HOURS
OF LIVE CAPTIONING + ASL



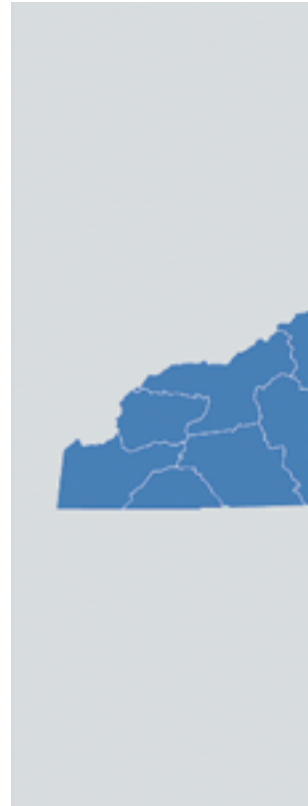
100

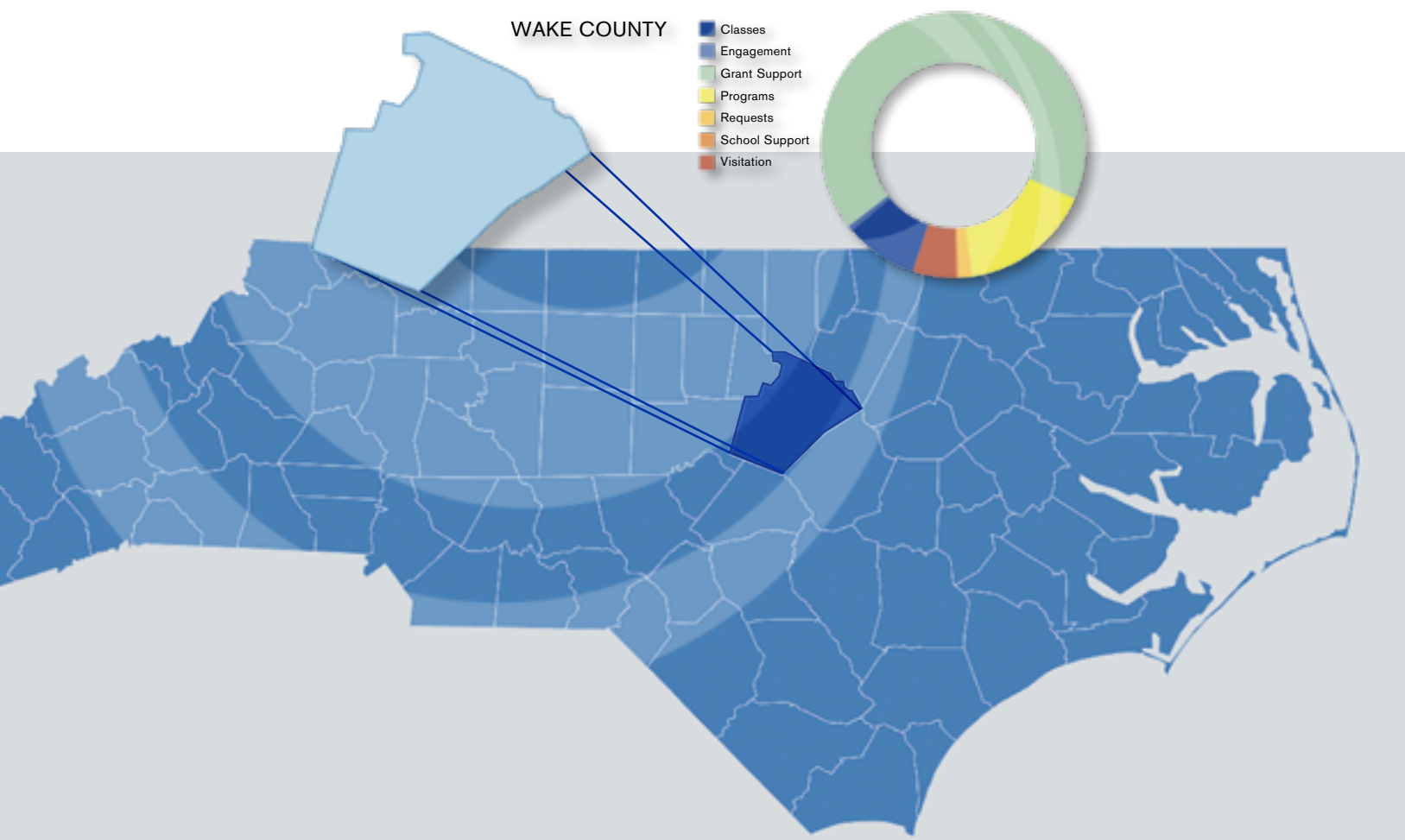
COUNTIES
SERVED BY NCMNS



56

INSTITUTIONS
RECEIVED SCIENCE GRANTS







Two-toed Sloth

Sloths are the slowest mammals on Earth, moving so slowly that predators often fail to see them. A unique



Two-toed Sloth

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AN ENVIRONMENT THAT FOSTERS INNOVATION

High-Tech Paleontology

The Museum's Research Curator of Paleontology, Dr. Christian Kammerer, co-authored a paper redescribing *Bolotridon*, historically one of the most poorly known cynodonts (a group of synapsids, or "protomammals," that include modern mammals as their descendants). Kammerer and colleagues used computed tomographic (CT) scanning to reveal new anatomical information in the only known *Bolotridon* skull, a specimen housed in Munich, Germany. [FOLLOWING PAGE]

Citizen Science

Citizen science efforts, with the Head of Citizen Science Chris Goforth at the helm, were active in 35 different projects that engaged scientists, volunteers and visitors at Prairie Ridge. These projects ranged in topic from biology to astronomy to meteorology and engaged people of all ages over five. Five large-scale Facebook Live events were also offered during the pandemic — "National Moth Week," "Great Backyard Bird Count," "Fireflies on the Prairie," "Party at Your Porch Light" and "Celebrating Moths." These

attracted thousands of participants worldwide. Additionally, the City Nature Challenge for the Triangle Area of NC was coordinated by the Prairie Ridge staff again; the group finished 17th out of nearly 400 cities for the number of observations submitted to iNaturalist. Plus, the in-person program "Citizen Science: Interactive STEM for Active Engagement," involved educators in data collection and data manipulation over a 5-day period at the NC Center for the Advancement of Teaching on Ocracoke. [FOLLOWING PAGE]

[FOLLOWING PAGE] The newest addition to Contentnea Creek is the Monarch Meadows pollinator garden designed especially for the survival of the Monarch Butterflies. When complete, this garden will consist of 100 or more 8-ft by 8-ft plots to grow milkweed, which is the only plant Monarch Caterpillars eat, and support a variety of flowering, nectar plants that all pollinators need to survive.

[PREVIOUS PAGE] The Exhibits and Digital Media teams developed cutting-edge 3D virtual tours of the Museum, allowing visitors to step into a virtual space almost identical to that of the Museum itself. Once inside the gallery, users can read pop-up labels, view images, and watch videos as if they were really there.

[FOLLOWING PAGE.] Dr. Dombrowski, Chief Veterinarian at the Museum performing an annual wellness exam on one of the Museum's common snapping turtles. This one passed his checkup with flying colors.



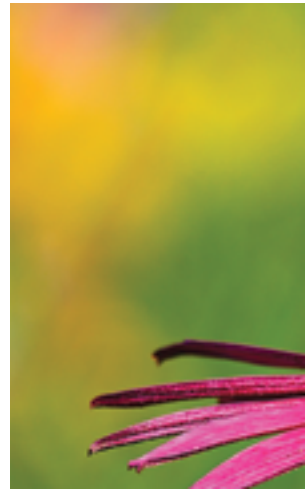
2,550
PARTICIPANTS
ENGAGED THROUGH
ECO-EXPLORE



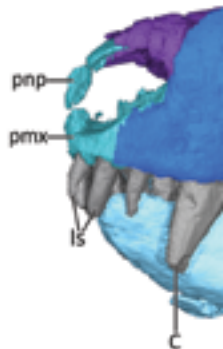
400
ANIMAL WELLNESS
EXAMS

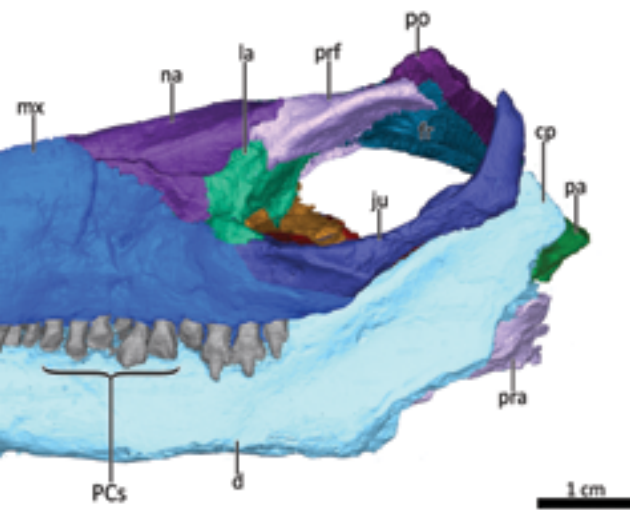


20
COUNTRIES
REACHED BY
“LOVE NATURE” PODCAST



B









NIMBLE & RESPONSIVE

Pandemic Response

In response to the global COVID-19 Pandemic, staff throughout the downtown Raleigh location had to completely rethink their approach to their work. While many team members scrambled to get the equipment needed to work from home in March 2020, others needed to be onsite to provide security to the Museum, maintain the facilities and take care of the thousands of live animals in the building. As reopening became a possibility in September 2020, the Exhibits and Digital Media teams got to work creating and installing over 600 COVID-related labels, kiosks, sanitization stations and floor-markings to help visitors navigate the Museum safely. Exhibition staff also introduced a rigorous daily cleaning routine for all high-touch surfaces. Our Guest Services team developed plans to greet customers, educate them on COVID protocols, and limit capacity; while the Facilities team worked to arrange for upgrades to the HVAC system and add UV lighting to the air handlers. Evaluation data revealed that more than 83% of visitors felt that these measures made them more likely to attend the Museum during the Pandemic. [PREVIOUS PAGE]

Virtual Story Time

Staff at the NC Museum of Natural Sciences at Whiteville also pivoted quickly to provide a diversity of on-demand and live virtual programming options. By April 1, 2020, they published their first Storytime Online video on Facebook, a series of original stories written, illustrated, recorded and produced by staff and volunteers in Whiteville each week with an associated educational activity. They held live interactive public programs and maintained partnerships with local schools through a new Virtual Program Studio. They even delivered materials to local schools for complementary hands-on activities, so students were still able to dissect squids, build sweep nets, examine tree cookies, and uncover fossils during virtual programs. [FOLLOWING PAGE]

[FOLLOWING PAGE] The Education and Digital Media sections worked hard to bring Discovery Room programs to young learners via a new distance learning studio.

[FOLLOWING PAGE] The Environmental Educators of North Carolina (EENC), NC's professional organization for environmental educators, presented the 2020 Exceptional Environmental Education Program Award to the Museum's Teacher Education staff, Melissa Dowland and Megan Davis, for their online professional development series that reached 200 educators, "Nature Neighborhood." In March 2021, they also received the 2020 Award of Excellence from the North Carolina Museums Council.



1,185

LIVE VIRTUAL
PROGRAMS



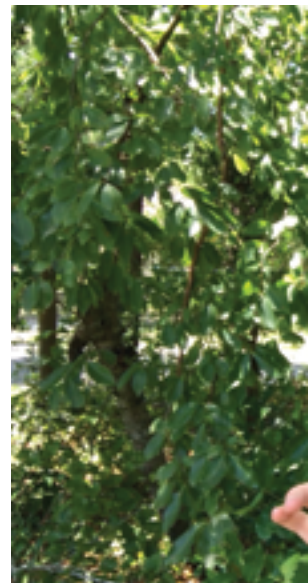
46,877

LIVE VIRTUAL
PARTICIPANTS



30,000

NEW FOLLOWERS
ON SOCIAL MEDIA





PUBLICATIONS

A new species of Pterodrilus (Branchiobdellida: Clitellata) from the upper Yadkin-Pee Dee River Basin of North Carolina
BW Williams, AJ Phillips
Journal of Natural History 55 (23–24), 1491–1498

Cranial anatomy of Bolotridon frerensis, an enigmatic cynodont from the Middle Triassic of South Africa, and its phylogenetic significance
LC Pusch, CF Kammerer, J Fröbisch
PeerJ 9, e11542

Major shortfalls impairing knowledge and conservation of freshwater molluscs
M Lopes-Lima, N Riccardi, M Urbanska, F Köhler, M Vinarski, AE Bogan ...
Hydrobiologia, 1–37

Keratan sulfate as a marker for medullary bone in fossil vertebrates
A Canoville, LE Zanno, W Zheng, MH Schweitzer
Journal of Anatomy 238 (6), 1296–1311

Variation in predicted COVID-19 risk among lemurs and lorises
AD Melin, JD Orkin, MC Janiak, A Valenzuela, L Kuderna, F Marrone III, JE Horvath ...
American journal of primatology, e23255

Can mammals thrive near urban areas in the Neotropics? Characterizing the community of a reclaimed tropical forest
S Schuttler, S Ramcharan, H Boone, S Stone, BJ O'Shea, K Gajapersad, R. Kays ...
Tropical Ecology 62 (2), 185

Dicynodonts (Therapsida: Anomodontia) of South America
CF Kammerer, M de los Angeles Ordoñez
Journal of South American Earth Sciences 108, 103171

Estimating encounter location distributions from animal tracking data
MJ Noonan, R Martinez-Garcia, GH Davis, MC Crofoot, R Kays, BT Hirsch ...
Methods in Ecology and Evolution

A new species of Pareas (Squamata, Pareidae) from southern Vietnam
DTT Le, TG Tran, HD Hoang, BL Stuart
Vertebrate Zoology 71, 439

High-throughput sequencing outperforms traditional morphological methods in Blue Catfish diet analysis and reveals novel insights into diet ecology
HK Evans, AJ Bunch, JD Schmitt, FJ Hoogakker, KB Carlson
Ecology and Evolution 11 (10), 5584–5597

Glossifungites gingrasi n. isp., a probable subaqueous insect domicile from the Cretaceous Ferron Sandstone, Utah
MR King, AD La Croix, TA Gates, PB Anderson, LE Zanno
Journal of Paleontology 95 (3), 427–439

Brazilian Permian Dvinosaurs (Amphibia, Temnospondyli): Revised Description and Phylogeny
C Marsicano, KD Angielczyk, JC Cisneros, M Richter, CF Kammerer ...
Journal of Vertebrate Paleontology, e1893181

Evidence from South Africa for a protracted end-Permian extinction on land
PA Viglietti, RBJ Benson, RMH Smith, J Botha, CF Kammerer, Z Skosan ...
Proceedings of the National Academy of Sciences 118 (17)

Nominal taxa of freshwater Mollusca from Southeast Asia described by Dr. Nguyen N. Thach: A brief overview with new synonyms and fixation of a publication date
IN Bolotov, ES Konopleva, IV Vikhrev, MY Gofarov, M Lopes-Lima, AE Bogan ...
Ecologica Montenegrina 41 (1), 73–83

Disturbance type and species life history predict mammal responses to humans
JP Suraci, KM Gaynor, ML Allen, P Alexander, JS Brashares, R Kays, SA Schuttler, AW Parsons ...
Global Change Biology

SNAPSHOT USA 2019: a coordinated national camera trap survey of the United States
MV Cove, R Kays, H Bontrager, C Bresnan, M Lasky, T Frerichs, R Klann ...
Ecology, e03353

Spatiotemporal variation in completeness of the early cynodont fossil record and its implications for mammalian evolutionary history
GL Varnham, PD Mannion, CF Kammerer
Palaeontology 64 (2), 307–333

Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus Mitchell, 1815) early life stage consumption evidenced by high-throughput DNA sequencing
AJ Bunch, KB Carlson, FJ Hoogakker, LV Plough, HK Evans
Journal of Applied Ichthyology 37 (1), 12–19

Beyond species counts for assessing, valuing, and conserving biodiversity: response to Wallach et al. 2019
NFV Meyer, N Balkenhol, T Dutta, M Hofman, JY Meyer, EG Ritchie, MV Cove ...
Conservation Biology 35 (1), 369–372

Fawn counts and adult female site use are mismatched indicators of habitat quality in an endangered deer
JG Jacobs, MA Lashley, MV Cove
Diversity 13 (2), 92

A New Limnonectes (Anura: Dicroglossidae) from Southern Thailand
S Yodthong, A Rujirawan, BL Stuart,
A Aowphol
Animals 11 (2), 566

A Novel Power-Amplified Jumping Behavior in Larval Beetles (Coleoptera: Laemophloeidae)
MA Bertone, JC Gibson, AE Seago,
T Yoshida, AA Smith
bioRxiv

A shot in the dark: White and infrared LED flash camera traps yield similar detection probabilities for common urban mammal species.
DJ Herrera, SM Moore, V Herrmann,
WJ McShea, MV Cove
Hystrix 32 (1)

Population-level inference for home-range areas
CH Fleming, I Deznabi, S Alavi,
MC Crofoot, BT Hirsch, EP Medici,
R Kays ...
bioRxiv

Elevated Cranial Sutural Complexity in Burrowing Dicynodonts
CF Kammerer
Frontiers in Ecology and Evolution, 449

Anatomical, morphometric, and stratigraphic analyses of theropod biodiversity in the Upper Cretaceous (Campanian) Dinosaur Park Formation
TM Cullen, L Zanno, DW Larson, E Todd,
PJ Currie, DC Evans
Canadian Journal of Earth Sciences 58 (9), 870-884

Heterodon simus (Southern Hog-nosed Snake). Reproduction and nesting
JC Beane, MD Martin, DC Smith,
SJ Horton
Herpetological review 52 (2), 424-425

Prevalence of Ranavirus, Batrachochytrium dendrobatidis, B. salamandrorans, and Ophidiomyces ophiodiicola in amphibians and reptiles of North Carolina, USA
TB Lentz, MC Allender, SY Thi, AS Duncan, AX Miranda, JC Beane,
D Dombrowski, AL Braswell,
BL Stuart ...
Herpetological review 52 (2), 285-293

Redescription of Lophorhynchus atopus (Ornithomimidae: Dinosauria) from the Late Cretaceous of Alabama based on new material
TA Gates, J Lamb
Canadian Journal of Earth Sciences

An extreme climate gradient-induced ecological regionalization in the Upper Cretaceous Western Interior Basin of North America
L Burgener, E Hyland, E Griffith,
H Mitášová, LE Zanno, TA Gates
GSA Bulletin

Age constraint for the Moreno Hill Formation (Zuni Basin) by CA-TIMS and LA-ICP-MS detrital zircon geochronology
CD Cilliers, RT Tucker, JL Crowley,
LE Zanno
PeerJ 9

Phylogenetic partitioning of the third-largest vertebrate genus in the world, Cyrtodactylus Gray, 1827 (Reptilia: Squamata: Gekkonidae) and its relevance to taxonomy
LL Grismer,
PL Wood, Jr., NA Poyarkov,
MD Le, F Kraus, I Agarwal,
BL Stuart ...
Vertebrate zoology 71, 101-154

Home range and movement patterns of the Andean Fox Lycalopex culpaeus (Molina 1782) in Cotopaxi National Park, Ecuador
A Castellanos, FX Castellanos,
R Kays ...
bioRxiv

Thinking outside the park: recommendations for camera trapping mammal communities in the urban matrix
DJ Herrera, SM Moore, DTT Flockhart,
WJ McShea, MV Cove
Journal of Urban Ecology 7 (1),
juaa036

Activity patterns of tayra (Eira barbara) across their distribution
ÁJ Villafañe-Trujillo, JM Kolowski,
MV Cove, EP Medici, BJ Harmsen ...
Journal of Mammalogy

Candid Critters : Challenges and Solutions in a Large-Scale Citizen Science Camera Trap Project
MP Lasky, A Parsons, SA Schuttler,
S Mash, L Larson, B Norton, B Pease,
H Boone, L Gatens and R Kays
Citizen Science: Theory and Practice 6 (1), 1-17

Global review of the effects of small carnivores on threatened species
MV Cove, AF O'Connell
Small carnivores: Evolution, ecology, behavior, and conservation

A new burnetiid from the middle Permian of Zambia and a reanalysis of burnetiamorph relationships
CF Kammerer, CA Sidor
Papers in Palaeontology

A new reptile from the lower Permian of Brazil (Karutia fortunata gen. et sp. nov.) and the interrelationships of Parareptilia
JC Cisneros, CF Kammerer, KD Angielczyk, J Fröbisch, C Marsicano ...
Journal of Systematic Palaeontology, 1-23

A comprehensive framework for handling location error in animal tracking data
CH Fleming, J Drescher-Lehman,
MJ Noonan, TSB Akre, DJ Brown,
R Kays ...
bioRxiv, 2020.06. 12.130195

Mitogenomic phylogeny and fossil-calibrated mutation rates for all F-and M-type mtDNA genes of the largest freshwater mussel family, the Unionidae (Bivalvia)
A Zieritz, E Froufe, I Bolotov,
DV Gonçalves, DC Aldridge,
AE Bogan ...
Zoological Journal of the Linnean Society

A new fanged frog in the Limnonectes kuhlii complex (Anura: Dicroglossidae) from northeastern Cambodia.
BL Stuart, SN Schoen, EEM Nelson,
H Maher, T Neang, JJJ Rowley ...
Zootaxa 4894 (3), zootaxa. 4894.3. 11-zootaxa. 4894.3. 11

Bacterial exposure leads to variable mortality but not a measurable increase in surface antimicrobials across ant species
O Halawani, RR Dunn, AM Grunden,
AA Smith
PeerJ 8, e10412

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A New Two-Lined Salamander (Eurycea bislineata Complex) from the Sandhills of North Carolina

BL Stuart, DA Beamer, HL Farrington,
JC Beane, DL Chek, LT Pusser,
AL Braswell ...
Herpetologica 76 (4), 423–444

Camera trap serendipity and citizen science point to broader effects of urban heat islands on food webs

DJ Herrera, MV Cove
Food Webs 25, e00176

Transcriptome ortholog alignment sequence tools (TOAST) for phylogenomic dataset assembly

DJ Wcisel, JT Howard, JA Yoder,
A Dornburg
BMC evolutionary biology 20 (1), 1–10

Data from: The social organization of the kinkajou Potos flavus (Procyonidae)
R Kays

Dinosaurs: How We Know What We Know
MH Schweitzer, ER Schroeter, CD Czapka
CRC Press

Rhesus macaques as a tractable physiological model of human ageing

KL Chiou, MJ Montague, EA Goldman,
MM Watowich, SN Sams, J Song,
JE Horvath ...
Philosophical Transactions of the Royal Society B 375 (1811), 20190612

Ecological insights from three decades of animal movement tracking across a changing Arctic

SC Davidson, G Bohrer, E Gurarie, S LaPoint,
PJ Mahoney, NT Boelman, R Kays ...
Science 370 (6517), 712–715

Seasonal flow dynamics exacerbate overlap between artisanal fisheries and imperiled Ganges River dolphins

S Paudel, JL Koprowski, MV Cove
Scientific reports 10 (1), 1–12

Does use of backyard resources explain the abundance of urban wildlife?

CP Hansen, AW Parsons, R Kays,
JJ Millsaugh
Frontiers in Ecology and Evolution 8, 374

The small home ranges and large local ecological impacts of pet cats

R Kays, RR Dunn, AW Parsons, B McDonald,
T Perkins, SA Powers ...
Animal Conservation 23 (5), 516–523

Molecular tests support the viability of rare earth elements as proxies for fossil biomolecule preservation

PV Ullmann, KK Voegelé, DE Grandstaff,
RD Ash, W Zheng, ER Schroeter,
MH Schweitzer ...
Scientific reports 10 (1), 1–11

Sampling impacts the assessment of tooth growth and replacement rates in archosaurs: implications for paleontological studies

JCD Kosch, LE Zanno
PeerJ 8, e9918

The Pleistocene-Holocene aquatic molluscs as indicators of the past ecosystem changes in Transbaikalia (Eastern Siberia, Russia)

OK Klishko, EV Kovychev, MV Vinarski,
AE Bogan, GA Yurgenson
Plos one 15 (9), e0235588

The conservation status of the world's freshwater molluscs

M Böhm, NI Dewhurst-Richman, M Seddon,
SEH Ledger, C Albrecht, AE Bogan ...
Hydrobiologia, 1–24

Phylogenomic analyses reveal a Palaeozoic radiation and support a freshwater origin for clitellate annelids

C Erséus, BW Williams, KM Horn,
KM Halanich, SR Santos, SW James ...
Zoologica Scripta 49 (5), 614–640

Bacterial communities in the natural and supplemental nests of an endangered ecosystem engineer

MS Thoemmes, MV Cove
Ecosphere 11 (9), e03239

Global diversification dynamics since the Jurassic: low dispersal and habitat-dependent evolution explain hotspots of diversity and shell disparity in river snails (Viviparidae)

B Stelbrink, R Richter, F Köhler, F Riedel,
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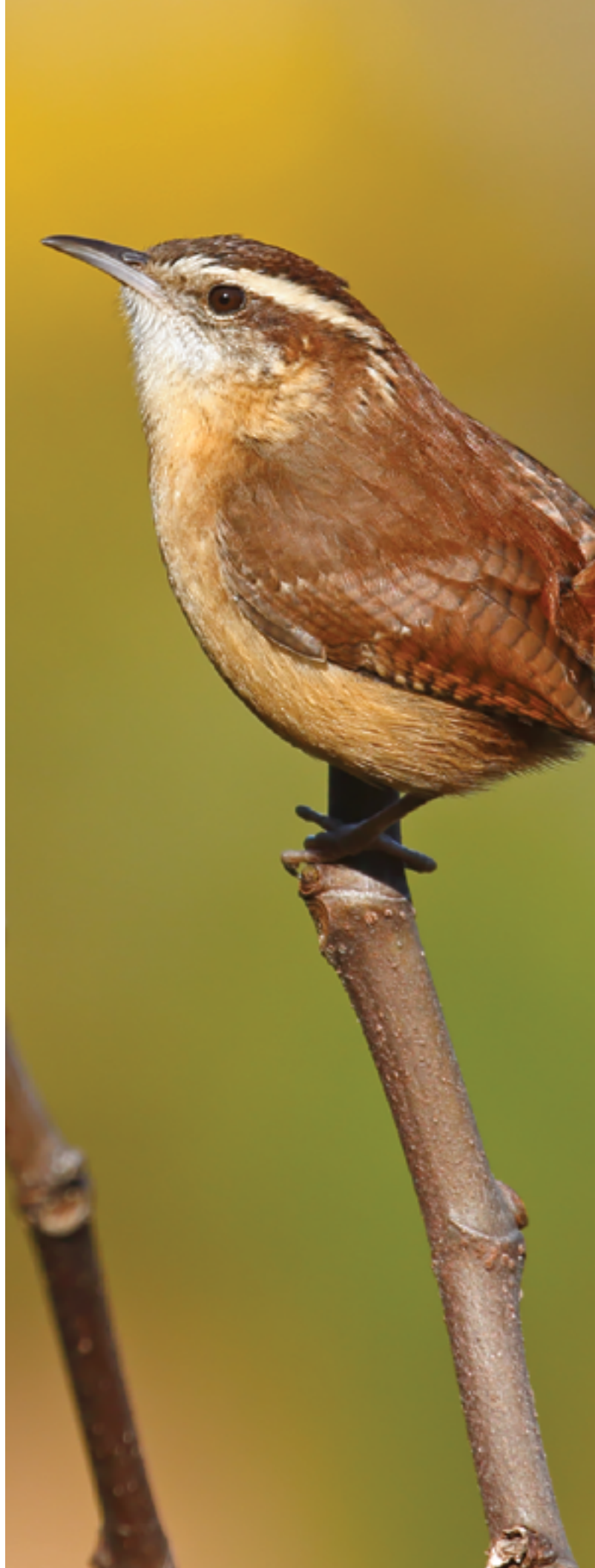
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ANNUAL REPORT

FY 2020-2021

Friends of the Museum

NORTH CAROLINA Museum *of* Natural Sciences





DEAR FRIENDS

Supporting the NC Museum of Natural Sciences is truly an honor. And while the Museum has spent the past year putting down roots — growing in new communities and reaching new audiences, — the Friends of the Museum has spent that time looking for new ways to help the Museum fulfill its mission of illuminating the natural world and inspiring its conservation.

When visitors could not access our retail spaces during the pandemic shut down, our team opened its first online Museum Store. And when large groups were prohibited from gathering indoors, our Museum Rentals team created event experiences for smaller groups, including an elopement package.

During a time of uncertainty and change, one thing remained constant — our patrons' commitment to helping us support the Museum in ways both big and small.

How big? Big enough to announce plans for construction of the SECU DinoLab, future home of the Dueling Dinosaurs, a \$14 million project that is bringing the world's most spectacular *Tyrannosaurus* and *Triceratops* fossils to Raleigh, North Carolina. This public-private partnership

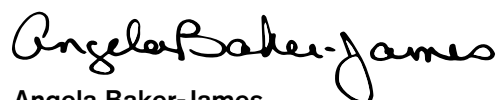
includes a challenge grant of \$2 million from the SECU Foundation and a \$1 million gift from Bank of America. Additional supporters are listed on pages 36 through 38.

How small? The number of small donations, \$15 or less, increased by 228% — these contributions were primarily add-ons to registrations for free virtual programming. Larger donations are essential to sustaining our programs, but we are equally proud of these small contributions, many from first-time donors. Why? Because they speak to a willingness to dig deep during less-than ideal times, to a gratitude for engaging educational content and to the potential for a continued relationship with the Friends and the Museum in the future.

Thank you to our donors — big and small — and to everyone who has joined or renewed their membership, made a purchase in our Stores, grabbed a bite to eat at the Daily Planet Café, caught a movie in our WRAL 3D Theater or hosted an event in the Museum's exhibit halls. Together we are expanding the reach of the North Carolina Museum of Natural Sciences and science education across our state and beyond.



Jason Barron
Chair of the Board
Friends of NCMNS



Angela Baker-James
Executive Director
Friends of NCMNS





SUPPORT

Donor Highlight

Many people have contributed to the Museum's success over its 142-year history. Far fewer people have shown the depth and breadth of support exhibited by Frank A. Daniels, Jr. Frank has been a member of Friends of the Museum since 1983, a Museum Advisory Commission member, a Friends Board Member, and a valued strategic advisor on every major campaign conducted by Friends of the Museum.

Over the years the Daniels family has supported Museum membership, the Annual Fund, the Capital Campaign for New Exhibits in 2000, the

Blue Whale Campaign, the Nature Research Center Campaign in 2012, and most recently the Dueling Dinosaurs Campaign. All told, the Daniels family has donated more than \$1 million to Friends of the Museum in support of Museum exhibits and programs, and Frank's strategic guidance has resulted in millions more.

Frank, a former publisher of The News & Observer, recently celebrated his 90th birthday. We asked him a few questions about his relationship with the Museum.

1. Why did you first get involved with the Museum? I really started getting involved with the Museum because of The News & Observer and the articles we would do about what was going on there. It's been my honor to be involved in several capacities as the Museum has grown.

2. What do you think of the growth the Museum has undertaken in the past 20–30 years? It's astounding and wonderful that the people of North Carolina have supported the growth of this Museum. The former Museum space in the back of the Department of Agriculture had lines outside the door to get in because that space was so small, we needed a bigger



SUPPORT

space, and we got that in 2000 with the Nature Exploration Center. Now with the Nature Research Center that opened in 2012, there is even more space for learning and research, too. I was proud to be able to help the Museum become affiliated with the Smithsonian when I was chairman of the Museum Advisory Commission, and I understand that the NCMNS is consistently the top-visited museum in our state.

3. What would you say to others who are considering becoming Museum supporters? Learning about science and our natural world is more crucial than ever, and the Museum is a wonderful way for people of all ages to learn and appreciate our world, especially our great state. I think the Museum does a great job of communicating this.

4. What do you see as the Museum's role in the community? At a time when science is being challenged, it is more important than ever to be able to connect to the community and demonstrate how the natural world works. One way the Museum does that is with our distance learning classrooms, which bring the

Museum virtually to children all across the state. Here in North Carolina, we are fortunate to have amazing plants, animals and an environment that is all worth protecting, and learning about them is the first step. Even snakes have a purpose once you have learned something about them.

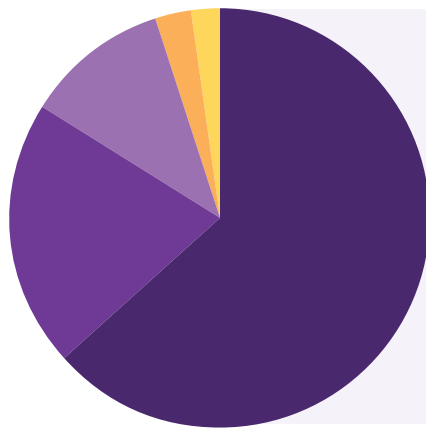
5. What is your favorite Museum exhibit? The Blue Whale exhibit in the Nature Exploration Center is my personal favorite.

Thank you to Frank Daniels and all our Museum supporters! And don't forget to check out the Blue Whale exhibit on the 2nd floor of the Museum's Nature Exploration Center the next time you are in downtown Raleigh.

FINANCIAL REPORT

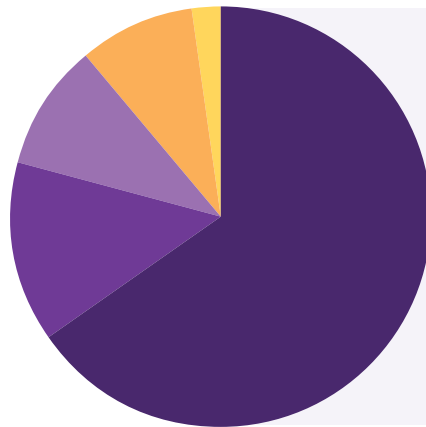
FY21 Many of the Friends revenue centers were closed or operating on a limited basis in FY21 due to the Covid-19 pandemic. The figures below only represent funds to and from Friends of the NC Museum of Natural Sciences and do not represent the Museum's operating funds provided by the State. One hundred percent of the Friends operations support the Museum, and sixty-six percent of those expenditures in FY21 directly supported Museum operations, exhibits, visitor experiences, collections, research, education and outreach.

Revenue



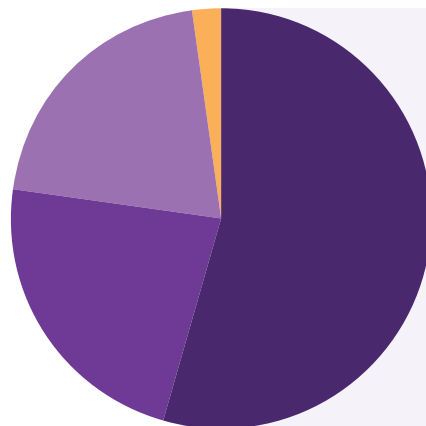
- **Contributions, Grants & Membership | 64%**
\$ 2,648,320
- **Covid-related Grants | 21%**
\$ 860,000
- **Museum Store | 11%**
\$ 445,211
- **Programs | 3%**
\$ 113,225
- **Other | 2%**
\$ 71,504

Expenses



- **Museum Support | 66%**
\$ 2,128,993
- **Museum Store | 14%**
\$ 455,274
- **General & Administrative | 10%**
\$ 322,704
- **Fundraising & Membership | 9%**
\$ 285,124
- **Rentals & Food Service | 2%**
\$ 57,587

Museum Expenses Broken Out



- **Exhibits & Visitor Experiences | 55%**
\$ 1,174,484
- **Collections & Research | 23%**
\$ 480,509
- **Education & Outreach | 21%**
\$ 437,142
- **Museum Administrative Support | 2%**
\$ 36,858

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