



# ANNUAL REPORT

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FY 2021–2022

Museum and Friends of the Museum

NORTH CAROLINA **Museum of Natural Sciences**





NORTH  
CAROLINA  
**Museum  
of Natural  
Sciences**

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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





# INTRODUCTION

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I'm delighted to present the FY 2021/2022 Annual Report for the North Carolina Museum of Natural Sciences. It covers the second year of work outlined in our current Strategic Plan, covering the Fiscal years 2022 through 2024. Like many, the fiscal year saw us looking for ways to establish a "new normal," as the pandemic continued to take its course. Although the Museum was again open, we learned from previous experiences and continued to offer 535 hours of quality online programming, in addition to making limited in-person programming increasingly available.

We continued to be at the forefront of innovation in research and interpretation. Importantly, we broke ground on the Dueling Dinosaurs gallery, which houses the groundbreaking new SECU DinoLab. What makes this space significant is the unique opportunity for Museum guests to come face-to-face with the spectacular Dueling Dinosaur fossils from inside the laboratory. While there, they will see, hear and feel the lab experience, while speaking directly to the paleontologists who are unlocking secrets of the tyrannosaur and *Triceratops* who died together mysteriously in the same event.

Our scientists made new discoveries about the world around us, from insect biomechanics and research on primate aging, to participation in a global assessment of threats to the World's reptiles. These and other breakthroughs have been successfully communicated to an increasing public, including almost 2 million website hits and 63,000 Facebook followers, an active blog, and 80 scholarly and popular publications. Our

public-facing offering was greatly enhanced by the unprecedentedly popular special exhibition *Exquisite Creatures: The Art of Christopher Marley*, which welcomed nearly 26,000 guests through its doors.

While carrying out these and many other important initiatives, we continued to make a statewide impact, through our branch museums in Greenville and Whiteville, administering over \$2.4M of State funding to regional science museums in North Carolina, and continuing our Hundred Counties Project, to ensure adequate attention was given to underserved communities across North Carolina.

I am deeply indebted to the outstanding staff of the Museum, who have continued to build on prior achievements toward the aspirational goals of our mission. While our circumstances have continued to improve, it has been far from business as usual and our Museum's wider family — Friends Staff and Board, our members, and the broader community — have remained codified in their support of the impact that this institution has made. Thanks must also go to the Department of Natural and Cultural Resources, whose unstinting attention has given us the infrastructure to continue our host of activities.



**Eric Dorfman, PhD**

Director & CEO

North Carolina Museum of Natural Sciences



A background image showing a hand reaching up towards a dense forest canopy with sunlight filtering through the trees.

# VISION & MISSION

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

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













# RELEVANT & INFLUENTIAL

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## Global Reptile Assessment

A new study published in April and led by scientists from the Museum and across the globe presents an analysis of the first comprehensive extinction risk assessment for reptiles on The IUCN Red List of Threatened Species, which found that at least 21% of all reptile species globally are threatened with extinction. The research revealed that efforts to conserve threatened mammals, birds and amphibians also benefit many threatened reptiles. According to Museum herpetologist and co-author of the study Dr. Bryan Stuart, North Carolina harbors important remaining populations of globally threatened reptile species, including the Bog Turtle (*Glyptemys muhlenbergii*), Spotted Turtle (*Clemmys guttata*), Southern Hognose Snake (*Heterodon simus*), and even our state reptile, the Eastern Box Turtle (*Terrapene carolina*). "This is a reminder that local conservation efforts here in North Carolina can have important impacts on maintaining global reptile biodiversity." Coverage included *The New York Times*, *Nature*, *USA Today* and more.

## 'Monkey Island' Hurricane

When Hurricane Maria slammed into Puerto Rico in September 2017, it killed thousands of people, knocked out power to nearly all the island's 3.4 million residents and caused more than \$100 billion in damages. It also impacted nearby Cayo Santiago, known as Monkey Island, which is home to a population of rhesus macaques that have inhabited the island since 1938. A research team including Museum genomicist Dr. Julie Horvath sought to study how extreme weather may affect human health and the aging process. The group took a closer look at the close evolutionary cousins of humans — the rhesus macaques on Monkey Island. Initial results showed the effects of this recent natural disaster may have molecularly accelerated aging in the monkeys' immune systems. "Our research underscores the importance of ongoing studies in these rhesus macaque monkeys to help us better understand the factors impacting health and aging across all primates, including humans," Horvath said. Coverage of the story ranged from *IFL Science* to UK's *The Guardian* and more.





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## These Beetles Go Boing

In January 2022, a team of researchers, including Museum entomologist Dr. Adrian Smith, discovered a jumping behavior that is entirely new to insect larvae, and there is evidence that it is occurring in a range of species — we just haven't noticed it before. The previously unrecorded behavior occurs in the larvae of a species of lined flat bark beetle (*Laemophloeus biguttatus*). Specifically, the larvae are able to spring into the air, with each larva curling itself into a loop as it leaps forward. What makes these leaps unique is how the larvae pull it off. "What makes the *L. biguttatus* so remarkable is that it leaps without latching two parts of its body together," co-author Matt Bertone said. "Instead, it uses claws on its legs to grip the ground while it builds up that potential energy — and once those claws release their hold on the ground, that potential energy is converted into kinetic energy, launching it skyward." The discovery was featured on *Science Friday*, *NPR*, *The Scientist*, and more.

## NBC's TODAY Show Visit

In case you missed it, NBC's Harry Smith came to the Museum in December 2021 to visit with Dr. Lindsay Zanno and get a closer look at the Dueling Dinosaur specimens. The interview aired January 5, 2022. "To be this close to a *T. rex* was much, much better than any movie," Smith said. "This exhibit is going to be amazing. Imagine being able to take your kids through there and say 'Look at this,' with a scientist right there. Fantastic."

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**Figure 1:** Publications are the most direct way of sharing the unique and innovative science discoveries made by the Museum's scientists. Scientific publications are read by scientists around the world to follow the most current advances in their fields of study.



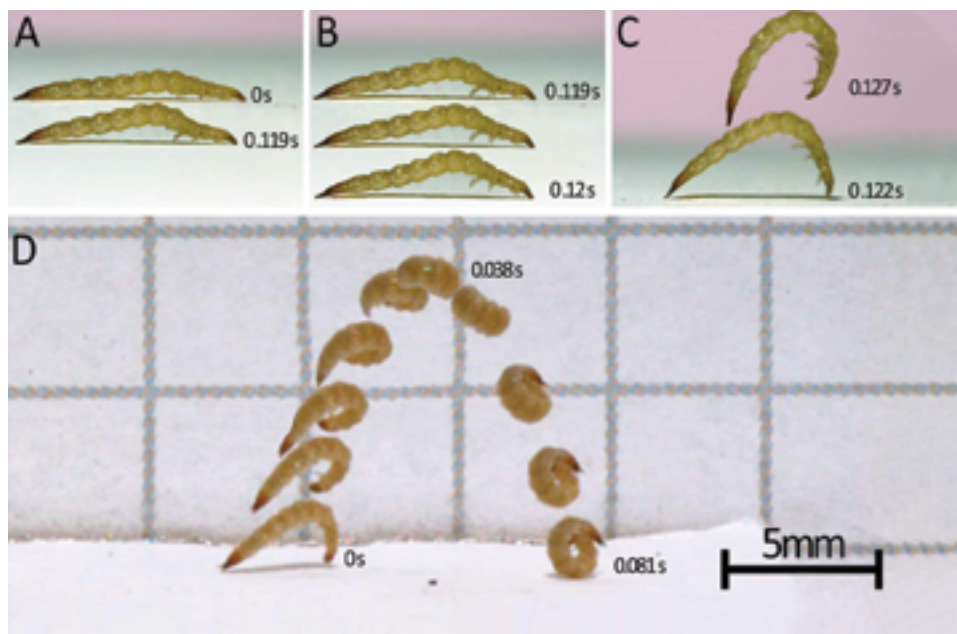
FIGURE 1



80

PUBLICATIONS

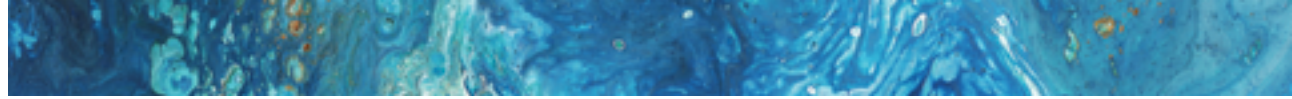
PEER REVIEW AND POPULAR PRESS











# PRIORITIZING PEOPLE

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## Whiteville Hosts Waccamaw Siouan Event

In November 2021, the North Carolina Museum of Natural Sciences at Whiteville hosted the Waccamaw Siouan Tribe for a celebration of their culture and heritage. The event was an amazing success, with more than 400 guests, vendors, dancers and volunteers on-site throughout the day. According to Whiteville director Dr. Shelby Laird, community response was overwhelmingly positive. “We are so grateful to the Waccamaw Siouan Tribe for enthusiastically sharing their heritage with all of us. They educated everyone on the meanings of different dances, songs and symbols, along with traditional knowledge demonstrations and STEM activities.”

## 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 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. The museum has created a series of pop-up exhibitions designed specifically for small venues. These panels will incorporate the genius of local fine artists and be tied to a companion website, [talkaboutrace.org](http://talkaboutrace.org). The panels will debut in three NCMNS locations — Raleigh, Whiteville and Greenville in Fall 2022.

## Greenville Facilities Open

After a long-anticipated, robust upgrade in exhibits and overall space, the former A Time for Science center on Dickinson Avenue opened to the public in September 2021. The Greenville location added about 3,500 square feet of adjoining warehouse space, more than doubling its original size to roughly 6,000 square feet. New exhibits cover topics ranging from public health to astronomy. The downtown Greenville facility is paired with Contentnea Creek, a 400-acre outdoor learning center in nearby Grifton that features paddling and hiking trails through a variety of habitats, as well as an observatory and a planetarium. Together, the Greenville and Contentnea Creek facilities welcomed 11,935 guests, and delivered 204 programs to 7,252 people, since September 2021.





## DEAI: Black Birders Week

To celebrate Black Birders Week (*May 29–June 4, 2022*) the Museum partnered with urban ecologist and movement co-organizer Deja Perkins for bird walks at our Prairie Ridge location in Raleigh and in Elizabethtown, just north of the Whiteville branch. What is the primary mission of Black Birders Week? According to Perkins, “Visibility, learning and connection. Initially, this event was birthed out of a place of trauma, but the second year we focused on Black joy in the outdoors, how you can get into birding, what are the tools you can use, how to be safe in the outdoors, and who are the people you can engage with. In 2022, we are focusing on soaring to greater heights, and we are focusing on highlighting the mental health benefits of birding, networking, intergenerational learning and social connection.”

## 9th Annual STEAM Showcase

The great jobs of today and tomorrow are in Science, Technology, Engineering, Art and Math (STEAM). Yet people with disabilities remain underrepresented in these fields. To help turn that tide, the Museum hosted its 9th annual STEAM Career Showcase for Students with Disabilities in October 2021. This free event, developed in partnership with SAS, is designed for students with disabilities in grades 6–12, and gives attendees a chance to meet and be inspired by role models with disabilities who have thriving careers in STEAM fields. This past event, held virtually, reached 1,129 participants from 83 NC counties, 26 U.S. states and 4 countries. This is the largest attendance for this event to date.

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**Figure 2:** As a state museum, NCMNS is mandated to serve North Carolinians across the state. The Museum tracks the number of counties served each year. In Fiscal Year 2022, 92 counties were served across each of seven service categories.

**Figure 3:** While onsite programming continued to be suppressed by the lingering effects of the pandemic, the Museum was again able to engage audiences online at a level higher compared to the 3-year pre-pandemic average. Offsite outreach began to increase during the 2022 fiscal year, but has not yet recovered to pre-pandemic numbers.



FIGURE 2

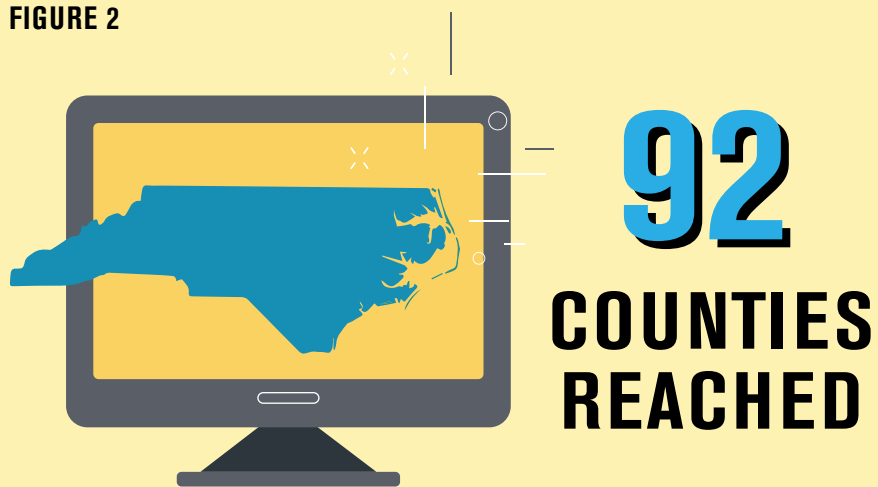
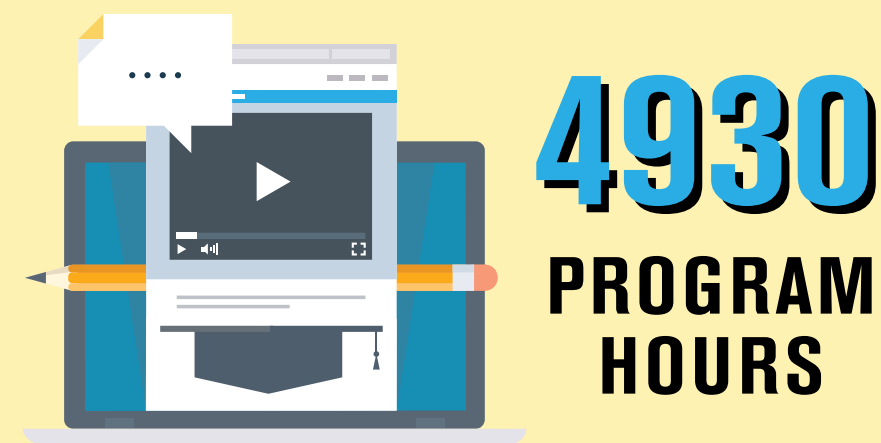


FIGURE 3









# AN ENVIRONMENT THAT FOSTERS INNOVATION

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## Dueling Dinosaurs Gallery Groundbreaking

The North Carolina Museum of Natural Sciences broke ground in September 2021 on the Dueling Dinosaurs gallery, which will house the SECU DinoLab, a state-of-the-art paleontology research lab that can't be found anywhere else in the world. The SECU DinoLab, to be located on the ground floor of the Nature Research Center, will be home to the Dueling Dinosaurs, 67-million-year-old fossils of a tyrannosaur and a *Triceratops* that were found buried together in Hells Creek, Mont. Scientists will work on and research the fossils (using the latest, cutting-edge methods and technologies) in front of Museum guests, who will have a chance to ask questions. According to lead paleontologist Dr. Lindsay Zanno, the Dueling Dinosaurs are the most-complete skeletons of these two popular dinosaurs in the world. The SECU DinoLab is slated to open to the public in fall 2023.

## Volunteer Summit

On August 30, 2021, The NC Museum of Natural Sciences cohosted the first DNCR Summit for Volunteer Services in collaboration with the NC Museum of History and the Governor's Commission on Volunteerism (VolunteerNC). The virtual summit allowed for statewide participation and beyond at no cost to participants or their institutions. In total, 94 people registered from four states: North Carolina, Georgia, New Jersey and Tennessee. Participants engaged in a full day of concurrent sessions, mostly lead by DNCR staff from sites across the state. The event was a huge success and teams were able to share best practices in the areas of volunteerism, internships and junior volunteers.





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## Veterinary Student Partnership

Chief Veterinarian Dr. Dan Dombrowski helped start the Museum Medicine Internship program and partnership with NC State University VetPAC (Veterinary Professions Advising Center) in 2011. Since then, the Museum has had almost 60 students participate in the program, with over 80 percent applying for and getting accepted into veterinary colleges. In fact, many are now practicing veterinarians. “We had three Veterinary Sciences VetPAC students working with us this past spring in the Window on Animal Health,” Dombrowski notes. “This program continues to provide a mentoring opportunity for students interested in Veterinary Sciences, provide the Museum with excellent interns, and creates a great dynamic for our Museum guests at the Window on Animal Health.” Over the past decade plus, the Museum Medicine program has welcomed almost 60 students, more than 80 percent of which have been accepted into veterinary colleges.

## Ancient DNA: The Making of a Celebrity Science

A new book from science historian Dr. Elizabeth Jones came out in March 2022 — “Ancient DNA: The Making of a Celebrity Science.” In this behind-the-scenes look, Jones reveals how the search for DNA from fossils flourished under the influence of intense press and public interest,

particularly as this new line of research coincided with the book and movie “Jurassic Park.” “Ancient DNA” is the first account to trace the historical and sociological interplay between science and celebrity in the rise of this new research field. As Jones argues, ancient DNA research is more than a public-facing science: it is a celebrity science. Jones is the coordinator for Cretaceous Creatures, a public science project in the Museum’s Paleontology Research Lab.

## ‘Love Nature’ Podcast

The Love Nature podcast grew by more than 250% over the past financial year, capping 10,000 listens before the year was out. Its open rate puts it in the top third of podcasts worldwide. The third season of the podcast wrapped up in August 2022, but early season guests included science communicator extraordinaire Elizabeth Graslie, author and activist Alexis Pauline Gumbs, fantasy/photography artist Benjamin Von Wong, and global honeybee muralist Matt Willey.

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**Figure 4:** Net Promoter Score is a customer loyalty and satisfaction measurement taken from asking customers how likely they are to recommend the museum. NCMNS has maintained a score for the past two years in excess of the 2018 multi-institutional COVES study science center average of 71%.

FIGURE 4



**76%**  
**NET PROMOTER SCORE**









# NIMBLE & RESPONSIVE

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## Triangle SciTech Expo In Person

On April 23, the Museum held its first “normal” event since the pandemic began ... our annual Triangle SciTech Expo. Nearly 4,000 guests attended this full-day event, marking a return to large-scale public science events at the Museum. SciTech is a signature event of the North Carolina Science Festival, and they celebrated their 3 millionth visitor that day! Activities included:

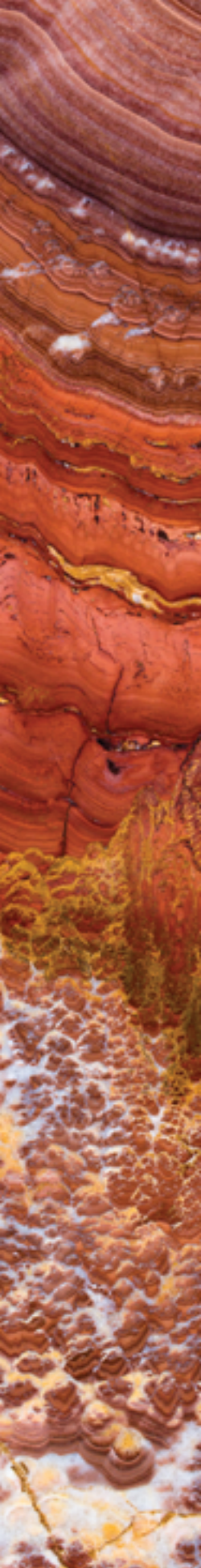
- Hearing presentations from students at NC Central University and NC A&T University.
- Making whirligig centrifuges, mimicking the life-saving innovation used to diagnose malaria in regions with limited electricity.
- Trying out robots from NC FIRST and the Techno Wolves.
- Learning about different natural dyes, from carmine to annatto.

The Triangle SciTech Expo was a huge success, bringing together STEM professionals from across the region to interact with visitors in a meaningful way.

## Reopening of Discovery Room

In April 2022, after being closed for two years, the Discovery Room reopened to a delighted public. During the pandemic, the Early Childhood and Elementary Unit had the opportunity to upgrade the room’s dinosaur material with funding, in part, from PNC Foundation and PNC employees. Working with the Museum exhibits section and local artist Max Dowdle, staff developed a large mural depicting dinosaurs and their evolution to modern birds, including a 3D *Hypsibema* dinosaur nest that children can sit inside. From April to June 2022, the Discovery Room hosted 11,461 visitors. Staff are hoping to return soon to pre-pandemic visitation of more than 65,000 visitors per year.





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## Girls in Science: A 30-Year Statewide Legacy

This year marks 30 years since the Museum launched the beloved Girls in Science program. This initiative began in the early 1990s, spearheaded by the late Caroline Dopyra, who worked as an educator. Now, Girls in Science is our second-longest-running educational program (Junior Curators recently concluded its 43<sup>rd</sup> year). Over the past three decades, Girls in Science has evolved to include a variety of impactful classroom programs, afterschool clubs, summer camps and outreach groups. As the COVID-19 pandemic presented unique challenges the past two years, our Youth Programs staff expanded to a virtual version of the program statewide, nearly doubling the number of students in the Girls in Science: Future Focus program and serving 22 North Carolina counties from the mountains to the coast.

## PNC Educator Workshops

Investments in early childhood education can lead to significant gains in the future academic success of students. This year, the Early Childhood and Elementary Unit completed a two-year grant, “Dinosaurs: A Gateway to Early Childhood Science Discovery.” Sponsored by the PNC Foundation and designed to reach low- to moderate-income families of young children, the grant focused on that perennially favorite topic of dinosaurs, in particular, the Dueling Dinosaurs. One of the highlights of the grant was our professional development workshop series.

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**Figure 5:** On-site visitation is still recovering post COVID closings, fiscal year 21/22 numbers exceeded our plan of 60% to “normal”.

FIGURE 5



**617,375**  
**ONSITE VISITORS**









# BUSINESS ACUMEN

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## Exquisite Creatures

"Exquisite Creatures: The Art of Christopher Marley" (Oct. 2021–March 2022) was a collection of 350 stunning three-dimensional displays of rare (*and real*) organisms from all over the world, including a Goliath birdeater tarantula from French Guiana, the largest spider species in the world; a Gaboon viper from Tanzania, sporting the largest fangs of any venomous snake in the world; zebra mantis shrimp from South China Sea, known to use their claws as hammers to bludgeon their prey; plus minerals and crystals including black chalcedony from India and vanadinite from Morocco. Marley is an Oregon-based artist, naturalist and photographer whose work uses preserved specimens to shine a light on the incredible diversity of nature. The special exhibition, the Museum's first in three years, welcomed just short of 26,000 guests and exceeded revenue and attendance goals by around 40%.

## Permian Monsters

Step back 290 million years, to a time when large, bizarre-looking animals began dominating life on land and sea, then find out about the greatest extinction event the world has ever seen, in "Life Before Dinosaurs: The Permian Monsters." This fascinating exhibition, running May 14 to Sept. 4, brings the past back to life with vivid artwork, mounted skeletons, and full-size life models of the animals that ruled the world millions of years before the age of dinosaurs, in a time known as the Permian Period. Included in the exhibition are specimens described by Museum paleontologist Dr. Christian Kammerer, a specialist on the origin of mammals (the group including us) from the reptile-like creatures of the Permian.

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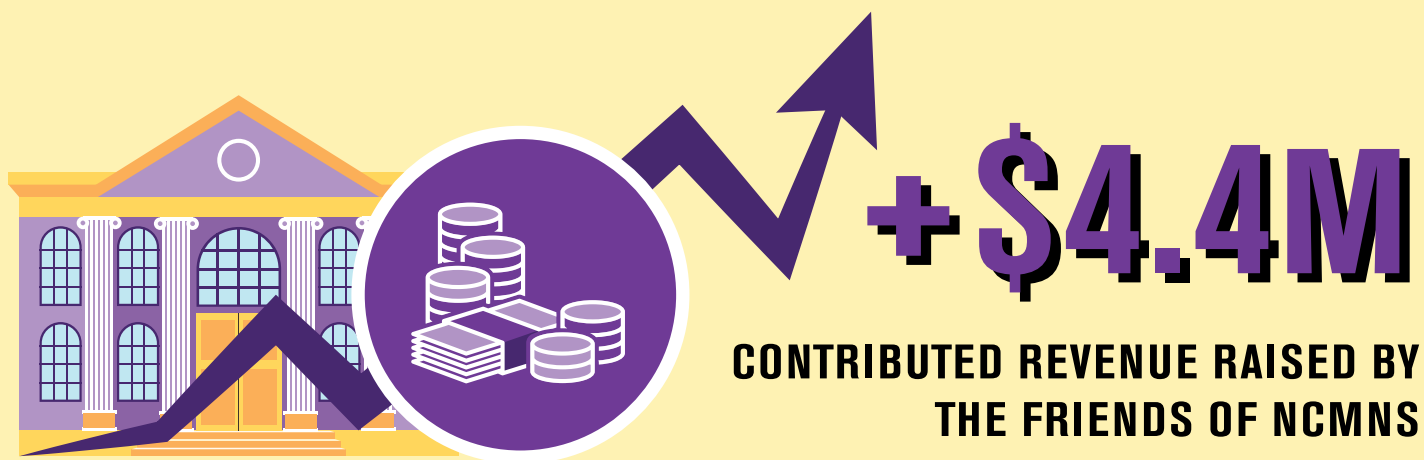
**Figure 6:** Through a combination of membership dues, grants and private and corporate donations NCMNS and the Friends of NCMNS raised more in contributed revenue than in any other year in recent history.







FIGURE 6









# AWARDS

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## **Governor's Award for Excellence**

In October, Jan Weems, the Museum's Head of Early Childhood & Elementary Education, received a 2021 Governor's Award for Excellence for her work to facilitate the establishment of the Gold Classroom Virtual Studio (an effort highlighted in last year's Annual Report). Weems worked with a team from the Education, Exhibits & Digital Media, Facilities and Living Collections sections under challenging and constantly changing conditions to make the Gold Classroom Virtual Studio a spectacular place to reach our audiences during the pandemic.

## **Goodman Award for Excellence in Strategy**

The International Association for Strategy Professionals awarded NCMNS an Honorable Recognition for the Museum's 2021-2023 Strategic Plan and encouraged us to reapply at the end of the strategic planning cycle to cite outcomes of this work. The IASP committee wrote:

"The North Carolina Museum of Natural Sciences (NCMNS) submission was well received by the Committee. It demonstrated

above average to excellent rating across the five criteria of strategy formulation. The overall presentation was clear, professional, and inspiring, with succinct appendices adding value to the submission. The Committee was inspired by the fact that this plan is the first in the museum's history, so for the plan to be that well developed is commendable. It was also noted by the Committee that NCMNS has a clear framework for strategic governance and a very thorough strategic formulation process, incorporating the necessary phases and steps to develop and track the progress of its strategy. Several value adding components of this framework include strategic foresight, thinking and innovation, analysis, and visioning."





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## Outstanding Mentor Award

In April, Museum Head of Paleontology Dr. Lindsay Zanno received the 2021 Outstanding Graduate Faculty Mentor Award in the Biological and Life Sciences category from NC State Graduate School. The award is designed to honor those outstanding mentors who are clearly devoted to the flourishing of their graduate students. “Dr. Zanno’s groundbreaking research in paleosciences is providing her students with the scientific rigor required for their future pursuits while simultaneously setting new standards that require and reinforce safety and respect during challenging and life-changing field experiences,” wrote NC State Head of Biological Sciences Carolyn Mattingly in support of the nomination. In addition to her Museum role, Zanno is an Associate Research Professor of Biological Sciences at NC State.

## Outstanding New Educator

In September, Brian Wuertz, Community Engagement Educator for the NC Museum of Natural Sciences at Whiteville, was named the winner of the Environmental Educators of North Carolina (EENC) Outstanding Newcomer award for 2021. This award recognizes an EENC member of five years or less who has made significant contributions during their short time with the organization. “Brian is one of the most engaging and talented environmental educators I’ve ever worked with,” wrote Dr. Shelby Gull Laird, Head of the NC Museum of Natural Sciences at Whiteville, in her nomination letter. EENC represents a network of outstanding environmental educators, individuals and organizations who work together to accomplish a core mission: to build connections, provide professional development, and promote excellence in environmental education.







# PUBLICATIONS

## 2022 — Peer reviewed

A quantitative framework for identifying patterns of route-use in animal movement data.  
*Frontiers in Ecology and Evolution*

Alavi, S. E., Vining, A. Q., Caillaud, D., Hirsch, B. T., Havmøller, R. W., Havmøller, L. W., **Kays, R.** ... et al.  
9(743014): 1–16.

Mass mortality events and declining obligate scavengers in the Anthropocene: Social feeders may be critical

Baruzzi, C., Barton, B. T., **Cove, M. V.**, & Lashley, M. A.  
*Biological Conservation*, 269(109527).

The Mississippi map turtle (*graptemys pseudogeographica kohnii*) in North Carolina, USA  
**Beane, J. C.**

*Herpetological Review*, 53(1), 95–96.

Comment on “The influence of juvenile dinosaurs on community structure and diversity”.  
Benson, R. B. J., Brown, C. M., Campione, N. E., Cullen, T. M., Evans, D. C., & **Zanno, L. E.**  
*Science*, 375(6578), 1–4.

A novel power-amplified jumping behavior in larval beetles (Coleoptera: Laemophloeidae).  
Bertone, M. A., Gibson, J. C., Seago, A. E., Yoshida, T., and **Smith, A. A.**  
*PloS ONE*, 17(1): e0256509.

Strata: William Smith’s geological maps.  
**Brinkman, P. D.**  
*Archives of Natural History*, 49(1), 221.

Seasonal patterns in daily flight distance and space use by great egrets (*Ardea alba*).  
Brzozad, J. N., Allen, M. C., Jennings, S., Condesco, E., Elbin, S., **Kays, R.**, et al.  
*Waterbirds*, 44(3), 343–355.

A pilot study on the home range and movement patterns of the Andean Fox *Lycalopex culpaeus* (Molina, 1782) in Cotopaxi National Park, Ecuador.

Castellanos, A., Castellanos, F. X., **Kays, R.**, and Brito, J.  
*Mammalia*, 86(1): 22–26.

Global camera trap synthesis highlights the importance of protected areas in maintaining mammal diversity.

Chen, C., Brodie, J. F., **Kays, R.**, Davies, T. J., Liu, R., Fisher, J. T. ... **Schuttler, S.** ... et al.  
*Conservation Letters*, e12865: 1–14.

Opossums: An adaptive radiation of new world marsupials.

**Cove, M. V.**  
Robert S. Voss and Sharon A. Jansa. 2021. Johns Hopkins University Press, Baltimore, MD, USA. 313 pp. \$59.95 hardcover. ISBN: 9781421439785 [book review]. *Journal of Wildlife Management*, 86(e22183).

Two invasive reptile species cohabitate in an active nest of the endangered Key Largo woodrat (*Neotoma floridana smalli*).  
King, K. C., Willson, M., Dixon, J., & **Cove, M. V.**  
*Southeastern Naturalist*, 21(2), N32–N36.

A global reptile assessment highlights shared conservation needs of tetrapods.  
Cox, N., Young, B. E., Bowles, P., Fernandez, M., Marin, J., Rapacciuolo, G., ... **Stuart, B.** et al.  
*Nature*, 605:285–290.

Evaluating the legacy of multiple introductions of American martens on spatiotemporal patterns of genetic diversity.  
Day, C. C., Gilbert, J. H., Manlick, P. J., Grauer, J. A., Pauli, J. N., Scribner, K. T., ... **Williams, B.**, et al.  
*Journal of Mammalogy*, 103(2), 303–315.

Population-level inference for home-range areas.

Fleming, C. H., Deznabi, I., Alavi, S., Crofoot, M. C., Hirsch, B. T., Medici, E. P. ... **Kays, R.** ... et al.  
*Methods in Ecology and Evolution*, 13(5): 1027–1041.

The taxonomy and phylogeny of the cyrtodactylus brevipalmatus group (squamata: Gekkonidae) with emphasis on *C. interdigitalis* and *C. ngati*.

Grismer, L. L., Rujirawan, A., Yodthong, S., **Stuart, B. L.**, Le, M. D., Le, D. T., et al.  
*Vertebrate Zoology*, 72, 245–269.

Prey selection and predation behavior of free-roaming domestic cats (*Felis catus*) in an urban ecosystem: Implications for urban cat management.

Herrera, D. J., **Cove, M. V.**, McShea, W. J., Flockhart, D. T., Decker, S., Moore, S. M., et al.  
*Biological Conservation*, 268(109503).

Social connections predict brain structure in a multidimensional free-ranging primate society.

Testard, C., Brent, L. J. N., Andersson, J., Chiou, K. L., Negron-Del Valle, J. E., DeCasien, A. R., ... **Horvath, J. E.** ... Sallet, J.  
*Science Advances* 8(eabl5794): 1–11.

The phylogenetic status of *Limnonectes liui* (Yang, 1983) (Anura: Dicroglossidae) based on mitochondrial genes and its taxonomic implications.

Huang, J., Li, Z., Liu, X., **Stuart, B. L.**, Yuan, Z., and Zhao, H.  
*Zootaxa*, 5092(1): 116–126.

Biological Earth observations with animal sensors.

Jetz, W., Tertitski, G., **Kays, R.**, Mueller, U., and Wikelski, M.  
*Trends in Ecology & Evolution*, 37(4): 293–298.

Globally, tree fecundity exceeds productivity gradients.

Journé, V., Andrus, R., Aravena, M., Ascoli, D., Berretti, R., Berveiller, D., ... **Kays, R.**, et al.  
Ecology Letters, 25(6), 1471–1482.

New material of dicynodon angielczyk (synapsida: Anomodontia) from Mozambique and Zambia with biostratigraphic implications for African permotriassic basins.

**Kammerer, C. F.**, Araújo, R., Cumbane, K., MacCungo, Z., Smith, R. M. H., & Angielczyk, K. D.  
Journal of Vertebrate Paleontology, e2041652.

Which mammals can be identified from camera traps and crowdsourced photographs?

**Kays, R.**, Lasky, M., Allen, M. L., Dowler, R. C., Hawkins, M. T. R., Hope, A. G., ... Cove, M. V.  
Journal of Mammalogy, gyc021.

A two-species occupancy model with a continuous-time detection process reveals spatial and temporal interactions.

Kellner, K. F., **Parsons, A. W.**, **Kays, R.**, Millspaugh, J. J., and Rota, C. T.  
Journal of Agricultural, Biological and Environmental Statistics: 1–18.

Shells of Pearlmussels, Margaritifera dahurica (Bivalvia: Margaritiferidae), as a biogeochemical indicator of the background (Holocene) and current major and trace elements content in riverine waters of Transbaikalia (Southeast Siberia).

Klishko, O. K., Berdnikov, N. V., **Bogan, A. E.**, and Vinarski, M. V.  
Ecological Informatics, 134(2022): 108482.

A partial tyrannosauroid femur from the mid-Cretaceous Wayan Formation of eastern Idaho, USA.

Krumenacker, L. J., **Zanno, L. E.**, & Sues, H.  
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# ANNUAL REPORT

FY 2021-2022

Friends of the Museum

NORTH CAROLINA **Museum *of* Natural Sciences**









# DEAR FRIENDS

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We began this past fiscal year in July 2021 with a sense of cautious optimism. Visitors were slowly returning after two quiet years, and Friends of the Museum was re-investing in the Museum by breaking ground last September on the Dueling Dinosaurs Gallery — which houses the SECU DinoLab, future home to the Dueling Dinosaurs — and bringing back special exhibitions after a three-year hiatus. Would we see long-time visitors returning to the Museum, an influx of first-time guests and inspired patrons renewing their memberships...or would we see a huge investment of time and money with little to show for it? As it turns out, supporting the North Carolina Museum of Natural Sciences has never been more rewarding.

We are happy to report that “Exquisite Creatures: The Art of Christopher Marley” (October 16, 2021–March 20, 2022) and “Life Before Dinosaurs: The Permian Monsters” (May 14–September 4, 2022) met our goals and more. Ticket revenue for our FY22 special exhibitions was 46% above goal and special exhibition store sales were 116% higher than the average of all prior exhibit store sales. Memberships purchased at our box office were 72% above goal. Beyond

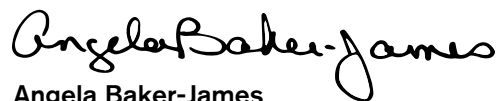
surpassing financial goals, Marley's works were a well-received blend of art and science, and the Permian research by the Museum's Research Curator of Paleontology Dr. Christian Kammerer received a well-deserved spotlight. The Friends of the Museum supported the Museum, and the Museum illuminated the natural world and inspired its conservation — a win-win for a special exhibition any way you look at it.

Thank you to everyone who visited our special exhibitions this year, and to our “Exquisite Creatures: The Art of Christopher Marley” sponsor, Merz Aesthetics and additional supporters Our State Magazine, PBS North Carolina, and WUNC, North Carolina Public Radio.

We hope to see you at our next special exhibition “James Cameron — Challenging the Deep” (October 15, 2022–May 7, 2023). Visitors will get a great experience tracing explorer and filmmaker Cameron's passion for deep-ocean science, technology and exploration, and Friends of the Museum gets to continue its support of the Museum's research, collections, exhibits and educational programs. Thank you for a great year!



**Jason Barron**  
Chair of the Board  
Friends of NCMNS



**Angela Baker-James**  
Executive Director  
Friends of NCMNS







# SUPPORT

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## Member Highlight

### The Puryear Family

#### *Jon, Fran, Jack and Maddy*

For many, the Museum is a family affair. For the Puryear family, their relationship with the Museum began more than 30 years ago. Fran Puryear fondly remembers visiting before the beloved snake, George the Python, passed away in 1989. As a preschool teacher, Fran would often bring her students on field trips to help ignite a passion for discovery in young minds. Before long, she and her husband Jon were igniting the scientific passions of their own two, Jack and Maddy, during their family visits to the Museum.

When son Jack was just 1 and daughter Maddy was just a baby, the Puryear's found the Museum an exciting and accessible place for their kids to freely learn and explore. Over the coming years, Fran and Jon delighted as their children's interests in science deepened.

Jack, who has been interested in becoming a paleontologist since he was around 2, now aspires to create scientifically accurate dinosaur

movies. Fran shared that Jack credits NCMNS as an integral part of his blossoming interests in paleontology. Maddy maintains a passion for all sciences; however, she has a particular interest in computer programming. She attended Girls in Science and appreciates having a space where girls share similar interests.

Motivated by a desire to support the institution and its mission, in 2014 the family "officially" became Friends of the Museum with a Family membership. "We wanted to support all the amazing things the Museum has to offer," said Fran. "The staff really takes the time to listen and answer the questions the children have." Of this summer's Member Night, Fran shared it "felt like a family reunion." This year, the Puryear's have increased their annual support, and we are delighted to welcome them to the Explorers Society.



# SUPPORT

## Donor Highlight

### An Enduring Legacy: John B. McMillan

John B. McMillan was a man of varied interests, a friend and mentor to many, and adored by all who knew him. The North Carolina Museum of Natural Sciences was one of the nearest and dearest causes to his heart, and he was often seen in a hard hat leading prospective donors around the unfinished Nature Research Center. In 1997, John helped secure the *Acrocanthosaurus* dinosaur specimen. He was so proud of the fossil and often brought family, friends, and colleagues to the striking glass dome that showcases the specimen. Fast forward nearly 20 years, and once again John was championing the Museum's acquisition of the most complete skeletons ever discovered of the two most iconic dinosaurs — *Triceratops* and tyrannosaur, the Dueling Dinosaurs.

John McMillan passed away February 6, 2019, after a long and courageous battle against cancer. But John's life was not defined by that struggle. It was a big life indeed, marked by a wonderful marriage to his wife Angie of more than 50 years, and by sisters and a brother, all of whom supported and adored John, along with countless friends and colleagues.

In 2019 several Friends Board members, both past and present, and supporters came together with an idea to honor John's legacy and celebrate his many contributions to the Museum. Over

the past three years, this committee has quietly raised more than \$50,000 toward the John D. McMillan Tribute Campaign in support of Dueling Dinosaurs.

In the coming year, this Campaign will be publicly launched in John's name with the funds raised supporting the public opening of the Dueling Dinosaurs. According to longtime Friends of the Museum board member, and member of the John B. McMillan Tribute Campaign Committee, Susan Valauri, a more fitting tribute could not be found, "Enlarging the Museum to showcase the Dueling Dinosaurs exhibit and inviting the public to witness these incredible specimens would put a big smile on John's face."

### John B. McMillan Tribute Campaign Committee:

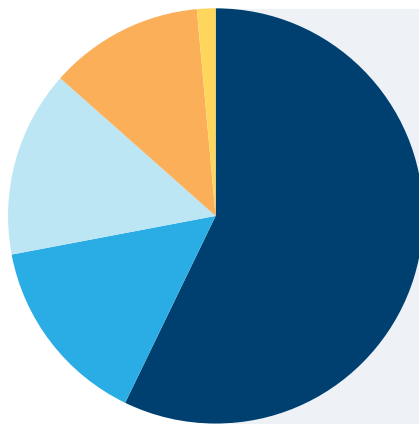
May Bensen, Bob Bilbro, John Hardin, George Teague, Susan Valauri and Anita Watkins



# FINANCIAL REPORT

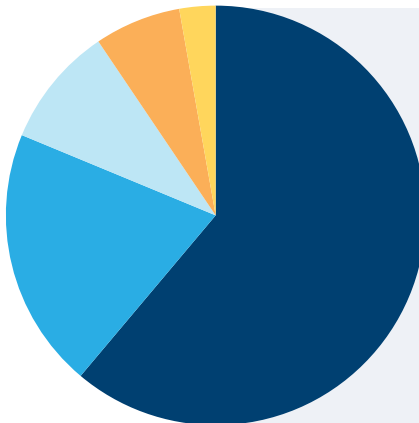
In the previous year, many of the Friends revenue centers were closed or operated on a limited basis due to the Covid-19 pandemic. FY22 saw an 88% increase in revenue over FY21 with just a 20% increase in expenses. Sixty-one (61)% of the Friends expenditures for the year directly supported Museum operations, visitor experiences, collections, research, education and outreach. The figures below represent funds to and from Friends of the NC Museum of Natural Sciences only and do not represent the Museum's operating funds provided by the State.

**Revenue**



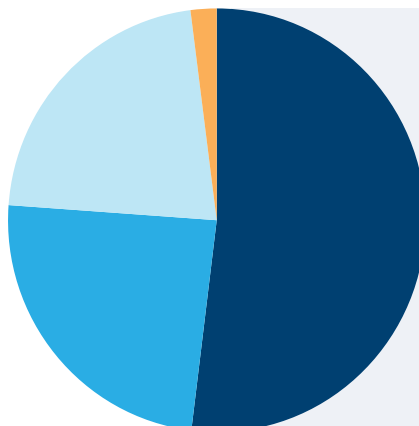
- **Contributions, Grants & Membership | 57%**  
\$ 4,420,788
- **Museum Store | 15%**  
\$ 1,147,680
- **Covid-related Grants | 15%**  
\$ 1,123,037
- **Programs | 12%**  
\$ 928,585
- **Other | 1%**  
\$ 111,832

**Expenses**



- **Museum Support | 61%**  
\$ 2,376,917
- **General & Administrative | 20%**  
\$ 782,186
- **Museum Store | 9%**  
\$ 361,956
- **Fundraising & Membership | 7%**  
\$ 258,935
- **Rentals & Food Service | 3%**  
\$ 108,237

**Museum Expenses Broken Out**



- **Exhibits & Visitor Experiences | 52%**  
\$ 1,281,887
- **Collections & Research | 24%**  
\$ 597,078
- **Education & Outreach | 22%**  
\$ 539,205
- **Museum Administrative Support | 2%**  
\$ 49,671



# THANK YOU

## FY22 DONORS

### \$1,000,000+

State Employees' Credit  
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### \$100,000–\$999,999

Duke Energy Foundation  
A.J. Fletcher Foundation  
Goodnight Educational  
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State Employees'  
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Carlyle Adams Foundation  
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PNC Foundation  
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### \$10,000–\$49,999

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Penelope Booze Foss  
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Andrea Nixon and Brent Friedenberg  
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The Friends of the North Carolina Museum of Natural Sciences at Whiteville supports the Museum's activities to illuminate the interconnectedness of nature and humanity in Southeastern North Carolina. The Museum plays a significant role serving the school children of Southeastern N.C. and Northeastern S.C. The Discovery Forest is a highlight for younger children along with the Nature PlaySpace to discover the natural wonders of the outside world. Visitors of all ages can marvel in the Investigate Lab and the Wildlife Walk on the NC Tree Trail. The Distance Learning Classroom links virtually with students and scientists from throughout North Carolina.

Through the acquisition and management of philanthropic gifts and grants, the operation of the gift shop, and volunteer opportunities, the members of Friends of the NC Museum of Natural Sciences at Whiteville, Inc are proud to support the mission of the Whiteville Branch. Board members Bill Thompson, Harold "Butch"

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