

**American Museum
of Natural History**

**Center for Biodiversity
and Conservation**



Progress Update Spring 2024

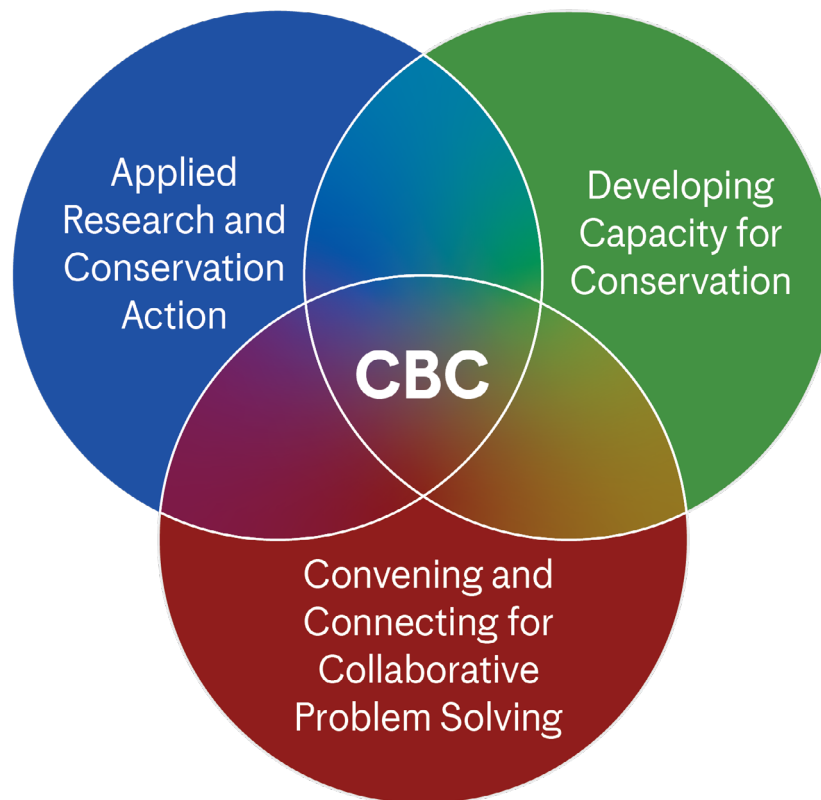
Photo: Nina Moysi

Center for Biodiversity and Conservation

What we do

Understanding life on Earth and how to sustain it for the future is the fundamental challenge of our time. The American Museum of Natural History is devoted to understanding our universe, our planet, and our role as humans. Through its Center for Biodiversity and Conservation (CBC), the Museum acts on that understanding and advances our collective endeavor of learning to live in harmony with nature.

The CBC's work aims to bring strong evidence—from multiple sources of knowledge and perspectives—to bear on complex conservation challenges, and to foster collaboration on robust, innovative, and equitable solutions. The challenge is both scientific and social, so we work by **connecting different strands of knowledge in our research**, **connecting people to knowledge**, and **connecting people to each other**.



Both longstanding and new projects are helping us deepen synergies with other scientific work at the Museum, support decision-making under climate change, and contribute to local and regional conservation and climate resilience. We are pleased to share recent highlights from our work in this report.

News, Awards, and Appointments

We are delighted to report that Dr. Jesse Barber will be joining the Museum as the new Curator and Jaffe Chief Conservation Scientist, starting in January 2025. Dr. Barber joins the Museum from Boise State University, where he has led research on the ecological consequences of loud and bright sensory environments for bats, birds, and insects. His research program integrates research and conservation practice on sensory ecology and sensory pollution with a robust public engagement program to protect biodiversity and advance ecological theory. His lab's work has shown that human-caused noise and light-at-night are indeed pollutants, with consequences on par with other drivers of biodiversity decline. Importantly, these sensory pollutants interact with climate change in ways that we are still trying to understand, and that could point to solutions with multiple benefits, as making the world quieter and darker reduces energy use, protects biodiversity, and improves human experience in nature.



In addition, two new postdocs will join the CBC in Fall 2024.

They are completing pre-hire requirements and have anticipated start dates in August and September.

Adam Jadhav, a geographer and political ecologist, will be the next Rizavi Innovation in Conservation Fellow. His interdisciplinary and innovative research program focuses on investigating species whose histories, populations, and ecology are intertwined with the forces of the Anthropocene, such as industrial harvesting, marine pollution, and climate change.



Dr. Ann Marie Gawel, an ecologist and interdisciplinary conservation scientist, will be the inaugural Eleanor J. Sterling Fellow. She aims to build on previous socio-ecological research on endangered snails, and advance ethnobotanical methods for integrating the biocultural value of plant species into conservation planning and management in Micronesia.



Dr. Mary Blair (Director of Biodiversity Informatics Research, CBC) accepted an invitation to join as an advisor to the U.S. Marine Biodiversity Observation Network's new Marine Species Distribution Modeling Consortium. The network plans to contribute large-scale analyses and Essential Biodiversity Variables for the U.S. National Nature Assessment.

The CBC's Director, Dr. Ana Porzecanski, accepted an invitation to join a global collaborative project, funded by the Blue Nature Alliance, that aims to catalyze major support for capacity development in marine protected and conserved areas, given ambitious Global Biodiversity Framework targets such as protecting 30 percent of oceans by 2030. A group of 25 conservation practitioners met in Mexico in February to kick off the work.

The Year in Numbers

15 Publications

13 Peer-reviewed

10 Open access

3 With local partners

8 With students, interns, mentees

5 Appointments

13 Presentations at professional meetings

6 Invited talks

14 Contributions to AMNH programs

5 Popular articles, media appearances or coverage

11 Funding proposals submitted

10 Average number of interns, mentees, and trainees per semester

2 New or updated open access software tools

The CBC has published several new studies this past season:

In a new [publication](#) from December 2023, Dr. Mary Blair advocated for the establishment of a new subfield of conservation science, "conservation museomics." In this piece, she argues that applying a conservation lens to the study of museum specimens and their associated information can "leverage the wealth of data stored in collections, as well as the interdisciplinary and public-facing nature of museums to better understand, conserve, and restore the natural world in the face of persistent global challenges, and support co-production and collaboration with Indigenous and local communities." She was invited to present this new idea as well as her work on conservation partnerships at the Stony Brook University Ecology and Evolution Colloquium Series in October, 2023.

In February 2024, Dr. Blair and colleagues published a [study](#) showing how incorporating geodiversity, or the diversity of landscapes including topography, can improve species distribution models, making these methods even more useful for spatial conservation planning and priority setting.

Finally, recent graduate Dr. Anna Penna and Dr. Blair published exciting results from NSF-funded work this May. The [study](#) shows how data in museum collections can be unlocked to better understand the evolutionary history of lorisiforms—lorises, pottos, and galagos. This work sheds new light on their evolution and the potential for cryptic diversity in the group, findings that are important for their conservation.



Dr. Mary Blair in the Museum's Mammology Collection



Senegal bushbaby (*Galago senegalensis*)
Photo: Petr Hamernik (CC BY-SA 4.0)

The CBC has also seen important impact and uptake of previous work.

CBC research has been used to shape the new United States Agency for International Development (USAID) Biodiversity Policy, which will guide investments in biodiversity projects around the world, and in the U.S. Fifth National Climate Assessment.

Two CBC papers have been “top downloaded papers” within their respective journals: a 2023 [paper](#) by Dr. Blair and collaborators on methods that facilitate linking estimates of species’ distributions into metrics relevant for conservation, and a 2021 [review](#) led by Biodiversity Specialist Erin Betley and the late Dr. Eleanor Sterling (Chief Conservation Scientist Emerita, CBC) on the different ways to measure human well-being that illustrates how two important aspects—human links to the environment, and equity—are often lacking in the metrics used in policy. In these and other ways, Dr. Sterling’s contributions continue to ripple through the conservation field.

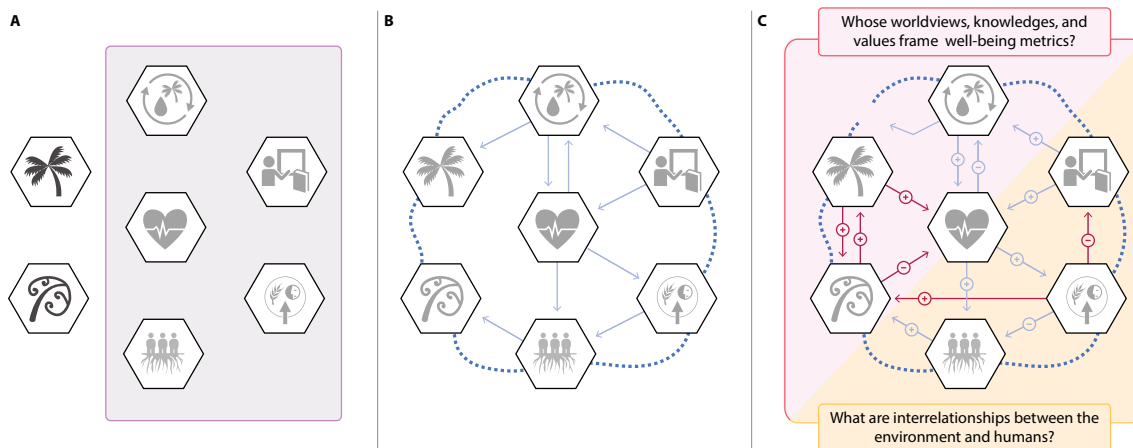


Figure 1. A new way of approaching well-being and how to measure it (from Betley et al 2021).

- Human well-being is multidimensional. Indices of well-being vary in terms of which dimensions are measured, for example some measure human well-being without considering the environment in which people live or without considering cultural dimensions (the seven icons shown are hypothetical dimensions derived from Sterling et al., 2020 and randomly placed within the space shown).
- Well-being is not simply a collection of dimensions, but rather a system of interrelated dimensions. Well-being emerges when the dimensions and interrelationships interact as a system, in which the whole is greater than the sum of its parts.
- In this paper, we use two different lenses or perspectives to help illuminate crucial components of well-being; a lens centered on equity and a lens on interrelationships between humans and the environment.

Finally, previous CBC research on the importance of multidisciplinary, systems-oriented inquiry continues to inspire and shape peer research on the wildlife trade. Recent studies building on this work have focused on community-held knowledge about slow lorises in Southern Thailand, on landscape urbanization in California, and on the importance of transdisciplinary research to better understand zoonosis emergence and transmission.

The CBC's software tools are used daily to support the analysis of biodiversity data and have been cited in thousands of peer-reviewed articles as well as government reports.

Maxent, the CBC-hosted software for modeling species niches and distributions that is used worldwide, has been cited more than 21,000 times. Since Fall 2023, Maxent has supported numerous conservation studies, including one published in *Science*—and highlighted on the cover—which [mapped](#) the global distribution of more than 35,000 plant species used by people (for food, medicine, and more) to make essential recommendations about sustainable management. The software was also used to [predict](#) the impacts of power lines on bird diversity in Norway, to [identify](#) essential breeding sites for the endangered golden eagle under climate change in Mexico, and to [predict](#) climate impacts on West Indian manatees.



Our species distribution modeling software tools *changeRangeR*, *maskRangeR*, and *Wallace* have been recently updated to new versions and were included for the first time in the global tool repository of GEO BON, The Group on Earth Observations' Biodiversity Observation Network.

DotDotGoose, the CBC's free, open-source software tool to count animals in images continues to be adopted for new uses. Senior Software Developer Peter Ersts was approached last fall by the Pacific Region of the United States Fish and Wildlife Service (USFWS) to assist them with implementing *DotDotGoose* for their monitoring efforts. Mr. Ersts added software enhancements to meet their needs and after several rounds of testing released version 1.7.0 of *DotDotGoose* in January 2024. Researchers from Scotland and New Zealand have also expressed interest in the newly added features.



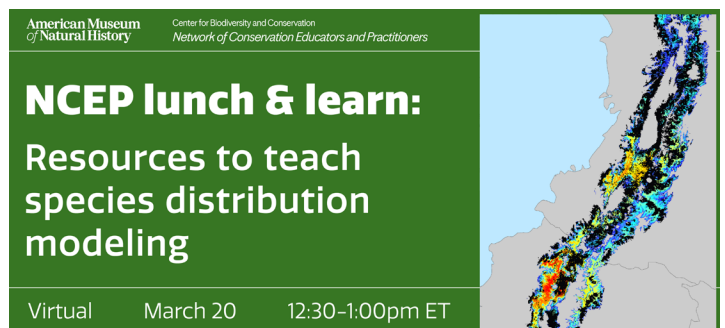
Capacity Development

The CBC is creating resources and spaces to train and empower conservationists everywhere.

In everything we do, we continue to prioritize open access learning resources, and the creation of inclusive environments so academics, students, professionals, and community members can contribute solutions to urgent conservation problems.

In December 2023, the CBC's Network of Conservation Educators and Practitioners (NCEP) program published a new volume of its electronic journal [*Lessons in Conservation*](#). The issue opens with an editorial by Dr. Porzecanski and 10 co-authors reflecting on Dr. Sterling's influence on conservation education and future priorities for the field. The issue features five student-facing educational resources that support learners to contribute to the scientific process, collect data, and analyze and model existing datasets using the same methods used by communities and scientists as part of conservation research. Included are new exercises by Dr. Blair and co-authors on how to use the software Wallace for species distribution modeling, in both English and Spanish.

Some of these resources were also highlighted at the recent webinar "NCEP lunch & learn: resources to teach species distribution modeling" (March 20, 2024). This 30-minute, bilingual webinar introduced the materials created by Dr. Blair and co-authors to over 100 attendees from all over the world.



The CBC continues to build conservation capacity through onsite training events. In March 2024, CBC staff led two workshops in Colombia to support use of the biodiversity monitoring and modeling methods developed with NASA funding. The first was a workshop to advance distribution models of marine invertebrates and fish with BioModelos and Wallace, in collaboration with the Instituto de Investigaciones Marinas y Costeras José Benito Vives de Andréis (INVEMAR), in Santa Marta, Colombia.



A second workshop was held at the Annual Meeting of the Colombian Society of Mammalogy in Yopal, Colombia. In these workshops, CBC Biodiversity Informatics Specialist Daniel Lopez Lozano and local collaborators provided training to 40 participants on new machine learning methods on modeling species distributions, including how to predict potential changes in species distributions due to climate change. In addition, thanks to the first workshop, marine species will be included in national calculations of representativeness of species in protected areas in Colombia for the first time.



Daniel Lopez Lozano explaining how to develop models of species distribution.



Convening and Connecting

The CBC catalyzes connections among key actors to innovate and gather strong evidence for action.

The CBC's five-year collaboration with the Integrated Natural Resource Management (INRM) Consortium, funded by USAID, is entering its final year. We continue providing on-demand insight and expert advice for agency teams on evidence relevant to land and resource governance, natural resource management, and climate change. During the past six months, the CBC has worked on two key projects: supporting the initial implementation of the new USAID Climate Change Strategy 2022-2030, and supporting the watershed management practitioners of the USAID Bureau of Humanitarian Assistance.

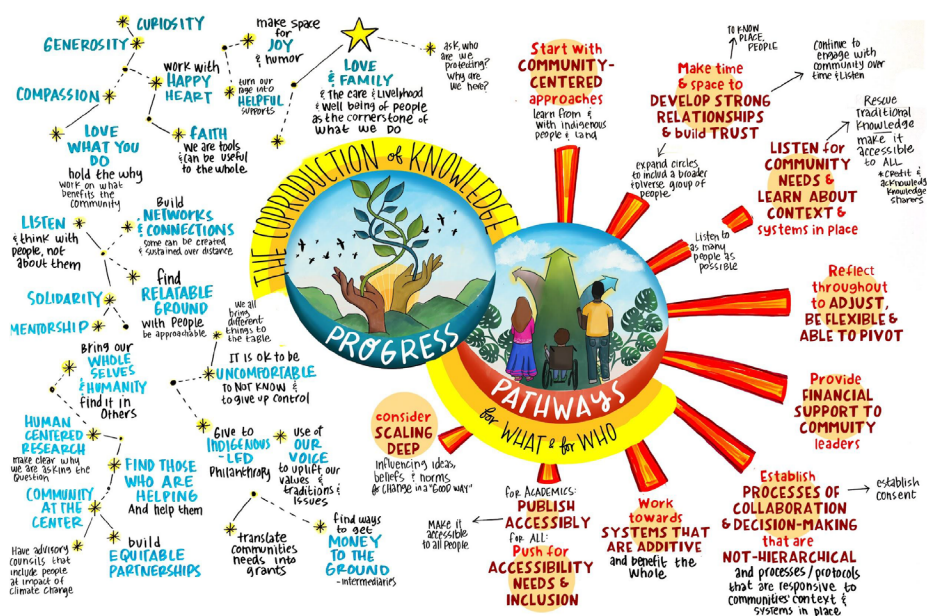
Under its new Climate Strategy, the Agency aims to support more than 80 countries in their climate change mitigation and adaptation commitments but lacked a system to measure progress towards this target. Since December 2022, Ms. Betley and others from the INRM consortium have worked with the Agency to develop a reporting framework, and provided direct support to 16 USAID Missions around the world so they can align their work on the ground with these aims.

In the second project, USAID's Bureau for Humanitarian Assistance (BHA) aims to increase programs that reduce disaster risk and increase resilience by managing at the watershed level. Dr. Porzecanski, Ms. Betley, and INRM colleagues have been supporting a dedicated community of practice focused on watershed management within the BHA to develop a learning agenda, a roadmap for evidence gathering. They designed and led an intensive five day workshop in Washington, D.C for 16 practitioners, including Mission staff from Ethiopia, Madagascar, Nepal, and Zimbabwe, to generate this learning agenda, which will be finalized in May 2024.



CBC staff have been invited to share expertise and explore collaborations around biocultural conservation in a number of fora. During Fall 2023, Dr. Porzecanski was an invited contributor to a new report, published by the University of Florida, on biocultural conservation in higher education. Given growing efforts by educators to incorporate the approaches into formal education programs around the world, the report is a valuable resource that summarizes information on biocultural conservation programs and shares findings and reflections from leaders in the field—highlighting the CBC's work in this arena.

In addition, in Spring 2024, Dr. Porzecanski and Dr. Blair were invited to contribute their expertise on biocultural conservation at a gathering at Columbia University on the co-production of knowledge, with researchers and Indigenous partners from Alaska, Nunavut, and Papua New Guinea. Over 20 participants contributed their experiences with environmental change from remote Alaska to New York City, and shared insights around the purpose, power dynamics, political dimensions, and pathways forward for knowledge co-production projects to grow understanding and actions towards climate change and biodiversity loss.



The gathering included an artist who created visual renderings of the discussions.

Our convening and connecting activities demonstrate valuable impacts over time. For example, the CBC-hosted New York Regional Species Distribution Modeling Discussion Group (NY-SDM), launched in 2001, connects 370 leading researchers from across the New York Tri-State area, including research scientists from industry and conservation organizations, as well as professors, graduate students, and postdoctoral scientists. In a recent evaluation, 90 percent of members reported that NY-SDM benefits their professional development by offering opportunities for networking and exchanging ideas, with 30 percent also noting the importance of receiving feedback on their research and learning about up-to-date methods advances.

"I really think that I wouldn't have been as successful or independent without being able to bounce ideas off of people [in NY-SDM]. I love how supportive the group is with helping all career stages figure out just what they need to do to improve their models." - NY-SDM group member

NY-SDM Members reported many examples—such as new SDM algorithms and highly influential papers—of how the group has steered innovation and best practices that have propelled the field forward. Other groups around the world have been inspired by NY-SDM, including a new discussion group recently started at the National Autonomous University of Mexico.

Exhibitions and Outreach

Catch the CBC online or onsite!

On November 13, 2023, the Museum debuted the special exhibition *The Secret World of Elephants*. The CBC contributed expertise to the special exhibition's final section, which provides visitors with information on how they can help protect elephants. The CBC also advised on three interactive elements illustrating issues relating to elephants and their habitats: illegal hunting and trade, climate change, and conservation.



Alvaro Keding/© AMNH

Dr. Blair contributed to the 2022 National Oceanic and Atmospheric Administration (NOAA) [Arctic Report Card](#), an authoritative report that summarizes the current state of the Arctic environmental system. Based on the extensive media coverage it received, NOAA has estimated that information about the Report Card may have potentially been seen more than three billion times!

In January 2024, the nearly 200 resources in the NCEP Module Collection moved to a permanent home in the Museum's David S. and Ruth L. Gottesman Research Library and Learning Center. The NCEP team worked closely with staff from the Library and the Museum's Communications Department for over a year to complete this project. Since the launch of the Collection's new home, the resources have received over 45,000 views and more than 5,000 downloads.

We continue to share our work through social media, you can find us on [LinkedIn](#), [X \(formerly Twitter\)](#), and [Facebook](#)!



Spring 2024

Publications

Blair, M.E. (2024). Conservation Museomics. *Conservation Biology*: e14234. <https://doi.org/10.1111/cobi.14234>

Carmenta, R., Zaehring, J. G., Balvanera, P., **Betley, E.**, Dawson, N. M., Estrada Carmona, N., Forster, J., Hoelle, J., Lliso, B., Llopis, J.C., Menon, A., Moeliono, M., Mustin, K., Pascual, U., Rai, N. D., Schleicher, J., Shelton, C., **Sigouin, A.**, **Sterling, E.J.**, Steward, A.M., Tauro, A., White, C., Woodhouse, E., and Yuliani, E.L. (2023). Exploring the relationship between plural values of nature, human well-being, and conservation and development intervention: why it matters and how to do it? *People and Nature*, 5(6): 1720–1738. <https://doi.org/10.1002/pan3.10562>

Chavez Michaelson A. B., Saavedra, F., and Buschbacher, R. (2023). How academia can contribute to biocultural conservation. **Porzecanski, A.L., invited contributor**. 58 Pages. <https://uftcd.org/biocultural-conservation-in-higher-education-report-just-released/>

Gerstner, B.E., **Blair, M.E.**, Bills, P., Cruz-Rodriguez, C.A., and Zarnetzke, P.L. (2024). Assessing the impact of scale-dependent geodiversity on species distribution models in a biodiversity hotspot. *Philosophical Transactions of the Royal Society A* 382(2269): 20230057. <https://doi.org/10.1098/rsta.2023.0057>

Goodman, A., Beatty, C., Busse, S., Ubukata, H., Miyazaki, T., **Blair, M.E.**, and Ware, J. (2024). Paleoecological niche modeling of Epiophlebia (Epiophlebioptera: Epiophlebiidae) reveals continuous distribution during the Last Glacial Maximum. *International Journal of Odonatology* 27: 60–76. <https://doi.org/10.48156/1388.2024.1917262>

Penna, A., Lui, H-L., **Blair, M.E.**, Kistler, L., and Pozzi, L. (2024). Overcoming challenges to extracting and sequencing archival DNA to support primate evolutionary research and conservation, with an application to galagos. *International Journal of Primatology*. (In Press) <https://doi.org/10.1007/s10764-024-00429-3>

Macey, S.K., Gazit, N., Douglas, K.E., and Porzecanski, A.L., editors. 2023. *Lessons in Conservation* 13(1). Published by the Network of Conservation Educators and Practitioners at the Center for Biodiversity and Conservation, American Museum of Natural History. Available from: ncep.amnh.org/linc

Volume 13 includes:

- Aiello-Lammens, M. E., Paz, A., Johnson, B.A., **Blair, M.E.**, and Pearson, R.G. (2023). A brief introduction to species distribution modeling for conservation educators and practitioners. *Lessons in Conservation* 13(1): 61–75. Full teaching module available at: <https://doi.org/10.5531/cbc.ncep.0184> En español: <https://doi.org/10.5531/cbc.ncep.0185>
- Cunningham, S.K., Murillo, K., Chan, K., and Lamb, J.B. (2024). Managing marine seascapes through community-based conservation. *Lessons in Conservation* 13(1): 15–37. Full teaching module available at: <https://doi.org/10.5531/cbc.ncep.0003>
- Freidenfelds, N.A., Deitloff, J.M., and Langkilde, T. (2024). Lessons from lizards: adaptation to introduced ants. *Lessons in Conservation* 13(1): 44–60. Full teaching module available at: <https://doi.org/10.5531/cbc.ncep.0001>

- Gosnell, J.S. (2024). What is community science, and how do I get involved? *Lessons in Conservation* 13(1): 38–43. Full teaching module available at: <https://doi.org/10.5531/cbc.ncep.0002>
- Johnson, B.A., Pinilla-Buitrago, G.E., Paz, A., Kass, J.M., Meenan, S.I., and Anderson, R.P. (2024). Creating and optimizing species distribution models: a vignette for Wallace ecological modeling application v2.0. *Lessons in Conservation* 13(1): 76–118. Full teaching module available at: <https://doi.org/10.5531/cbc.ncep.0184> En español: <https://doi.org/10.5531/cbc.ncep.0185>
- **Porzecanski, A.L.**, Akabas, S., **Betley, E.**, **Blair, M.E.**, Bynum, N., J. Ginsberg, J. R., Groom, M.J., **Macey, S.K.**, Moore, A.C., Rivera, C.J., and West, P. (2023). Lessons from a transformative conservation educator and building the future of conservation education. *Lessons in Conservation* 13(1): 5–14.

Presentations & Workshops Led

Blair, M.E. (2023). Partnerships for impact: collaborative science to inform biodiversity conservation. Invited featured speaker. Stony Brook University Ecology and Evolution Colloquium Series, Stony Brook, NY. 25 October 2023.

Doherty, L., Cooper, M.J., Nekaris, K.A.I., **Blair, M.E.**, vonCramon-Taubadel, N., and Poindexter, S.A. (2023). Characterizing separate slow loris species via landmark-based cranial morphology. Poster presentation. Joint Meeting of the Northeastern Evolutionary Primatologists and the Mid-Atlantic Biological Anthropology Interest Group. Richmond, VA. 4 November 2023.

Gutierrez-Velez, V.H., Mejia, A., Rodriguez, J., **Blair, M.E.**, and Corredor, L. (2023). Bringing together expert knowledge with national and global land cover datasets to facilitate ecosystem change assessment in protected areas in Colombia. Podium presentation. American Geophysical Union (AGU) Annual Meeting, San Francisco, CA. 12 December 2023.

Gutierrez-Velez, V.H., Rodriguez, J., Mejia, A., **Blair, M.E.**, and Londoño, M.C. (2023). Mapping forest cover and change as continuous rather than discrete variables is essential to advance forest monitoring across scales. Podium presentation. Group on Earth Observations Biodiversity Observation Network (GEO BON) Global Conference, Quebec, Canada. 12 October 2023.

Johnson, B.A., Pinilla-Buitrago, G.E., and Anderson, R.P. (2024). Spatial patterns and quantifications of habitat loss differ between remotely sensed resolutions and those required for IUCN Redlisting. Poster presentation. 11th Biennial Conference of the International Biogeography Society. Prague, Czechia. 7-11 January 2024.

Jair, J.C., Garcia-Castro, L.S., Chasqui, L.H., Zarate, J.C., and **López-Lozano, D.** (2024). Primer taller para la edición y validación de modelos de distribución de invertebrados y peces marinos con BioModelos y Wallace. Workshop. El Instituto de Investigaciones Marinas y Costeras José Benito Vives de Andréis (INVEMAR), Santa Marta, Colombia. 6-7 March 2024.

López-Lozano, D., Pinilla-Buitrago, G.E., and Grisales-Betancur, V. (2024). Del nicho al hecho hay mucho trecho: Introducción a Wallace. Workshop. Annual Meeting of the Colombian Society of Mammalogy, Yopal, Colombia. 11 March 2024.

Orkin J., Kuderna L., Hermosilla-Albala N., Fontseré C., Aylward M., Janiak M., Andriaholinirina N., Balaesque P., **Blair M.E.**, Fausser J.L., Gut I., Gut M., Hahn M., Harris A., Horvath J., Keyser C., Kitchener A.C., Le M., Lizano E.,

Merker S., Nadler T., Perry G., Rabarivola C., Raveendran M., Roos C., Wu D.D., Zaramody A., Zhang G., Zinner D., Pozzi L., Rogers J., Kai-How Farh K., and Marques-Bonet T. (2024). Genomic diversity and demographic history of the non-anthropoid primates. Podium presentation. 93rd meeting of the American Association of Biological Anthropologists. Los Angeles, CA. 20-23 March 2024.

Porzecanski, A.L. (2024). Biodiversity and you. Invited speaker. Montclair State University Environmental Club. Montclair, NJ. 28 March 2024.

Porzecanski, A.L. and **Betley, E.** (2024). Developing a learning agenda for the Watershed Management Community of Practice, Bureau of Humanitarian Assistance, United States Agency for International Development (USAID). Workshop. Washington, DC. 1-2 February 2024.

Pozzi L., Everson K.M., Barrett M.A., **Blair M.E.**, Donohue M.E., Kappeler P.M., Kitchener A.C., Lemmon A.R., Lemmon E.M., Pavón-Vázquez C.J., Radespiel U., Randrianambinina B., Rasoloarison R.M., Rasoloharijaona S., Roos C., Salmona J., Yoder A.D., Zenil-Ferguson R., Zinner D., and Weisrock D.W. (2024) Not one, but multiple radiations underlie the biodiversity of Madagascar's endangered lemurs. Podium presentation. 93rd meeting of the American Association of Biological Anthropologists. Los Angeles, CA. 20-23 March 2024.

Pozzi L., **Blair M.E.**, and Penna A. (2024) Unlocking museum collections: promises and challenges of museomic studies in African galagids. Podium presentation. 17th Annual Meeting of the Texas Association of Biological Anthropologists. Fort Worth, TX. 4 November 2024.

Media & Outreach

"Carbon catchers" AMNH Earth Day Video. **Porzecanski, A.L.** and **Gazit, N. Scientific advisors.** American Museum of Natural History (AMNH). New York, NY. 27 April 2024.

"What is biodiversity?" AMNH Hall of Biodiversity introductory video. **Porzecanski, A.L. Co-curator and featured interviewee.** American Museum of Natural History (AMNH). New York, NY. Spring 2024.

"Shaping the way we think about sustainability globally." **Porzecanski, A.L., Blog interviewee.** Somos Informada. 5 February 2024. iaminformada.com/ana-luz-porzecanski

"The sound of women leading: a concert and conversation on reframing leadership." **Porzecanski, A.L. Organizer, moderator, and speaker.** The Rockefeller Foundation's Connect Series, featuring Women Emerging's collaborators Mona Sinha, Isata Kabia, and artist and musician Anna Kuk. The Rockefeller Foundation, New York, NY. 16 January 2024.

"The new slow lorises." **Blair, M.E., Featured scientist.** British and Irish Association of Zoos and Aquariums (BIAZA). 25 October 2023. <https://tinyurl.com/BIAZALoris>