



AMERICAN MUSEUM OF NATURAL HISTORY  
CENTER FOR BIODIVERSITY AND CONSERVATION

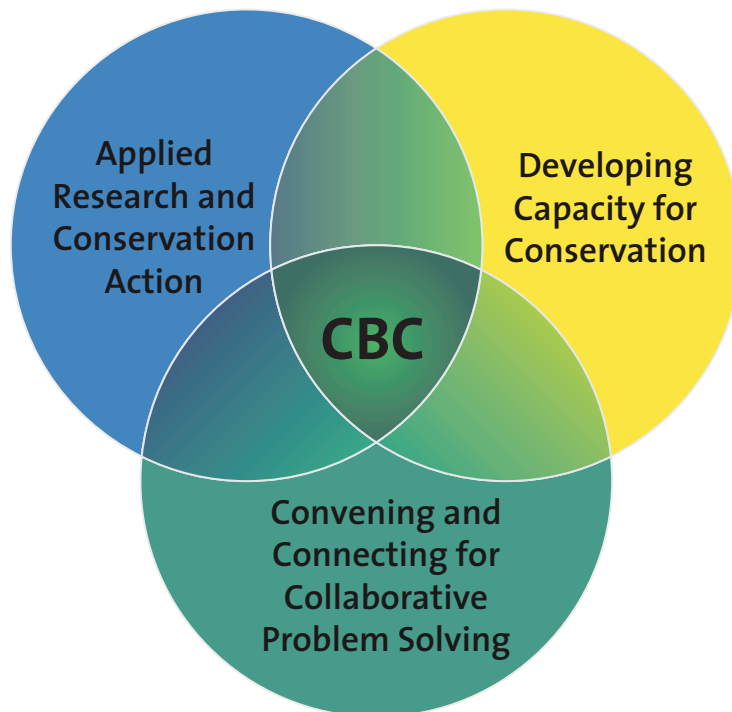
# Progress Report

Spring 2018



## What we do

The Center for Biodiversity and Conservation (CBC) transforms knowledge—from diverse sources and perspectives—into conservation action.



We believe that understanding life on Earth and how to sustain it is the fundamental challenge of our time. The American Museum of Natural History is devoted to understanding our universe, our planet, and our role. Through the CBC, the Museum acts on that understanding and contributes to our collective endeavor of learning how to live with nature in equitable ways.

The challenge is both scientific and social, so we work to connect different strands of knowledge, connect people to knowledge, and connect people to each other, to find innovative and sustainable solutions. This report presents highlights of our most recent accomplishments.



## The Year in Numbers

### 34 Publications

- 30 peer-reviewed
- 21 open access
- 8 with local partners
- 12 with students, interns, and mentees

### 33 Invited talks

- 12 Professional conference presentations

### 13 Funding proposals submitted

- 8 with AMNH
- 12 with external partners

3 New **open access** software tools and other resources produced

19 Mentees in conservation science

18 Popular articles, media appearances, or media coverage items

36 Museum public outreach events

4 Awards and honors

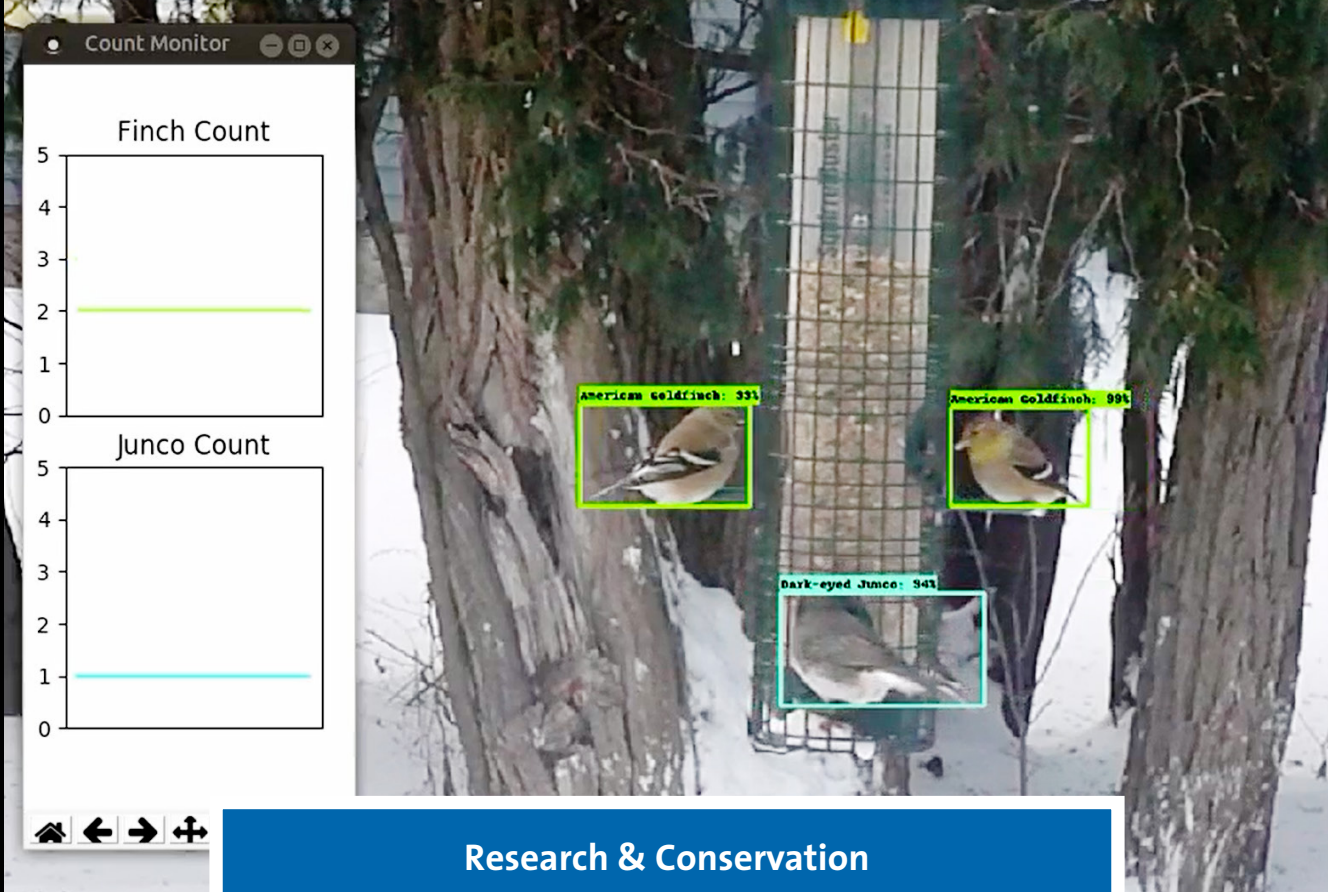
***Jaffe Chief Conservation Scientist Dr. Eleanor Sterling was awarded the 2018 WINGS WorldQuest Women of Discovery - Humanity Award***





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## Research & Conservation

# Conservation Planning and Monitoring


*The CBC's biodiversity informatics experts develop new methods, software programs, and training resources to help manage, analyze, and interpret biological and environmental data from expeditions, natural history collections, databases, and remote sensing instruments. A strong current focus is on advancing and promoting the use of **machine learning** for the understanding and conservation of biodiversity. All products are released with open-access licenses so students, educators, researchers, practitioners, and the general public can freely use them.*

We are pleased to report that CBC experts Peter Ersts and Ned Horning have launched a formal platform for the machine learning work presented at our last meeting in Fall 2017. **The Animal Detection Network** will convene researchers using camera traps for multiple species, and assemble a standardized baseline dataset that will allow the conservation community to develop and evaluate deep machine learning tools for automatically detecting and labeling animals. Mr. Ersts, the chief developer for this project, is refining a suite of tools for annotating, preparing, and exploring training data to develop models that will accurately identify animals in camera trap photographs.

Over the next few months, they plan to distribute an example open dataset to conservation groups that use camera traps. The dataset, containing 10 eastern North American species and pre-built models, will demonstrate the utility of deep machine learning approaches for automated identification and counting of animals. In the coming year, they hope to expand this dataset, apply the counting tools to species like flamingos and penguins, and release a tutorial on using machine learning for conservation. This research will generate open-access tools that are adaptable for a broad array of conservation applications—a potentially transformative resource for the field of conservation monitoring.

Dr. Blair's new project to improve informatics tools for conservation management, funded by NASA and the Group on Earth Observation's Biodiversity Observation Network (GEO BON), has begun. The project is a collaboration with the City College of New York (City University of New York), Yale University, Pace University, and the Alexander von Humboldt Institute in Colombia, which manages the Colombian BON. The team will expand the open-source species distribution modeling software Wallace to facilitate biodiversity change indicator calculations for GEO BON assessment and reporting. The project was featured in the Colombian newspaper *El Tiempo*, highlighting the importance of the new award for Colombian biodiversity.

Dr. Blair and collaborators convened a consultation workshop in Bogotá, Colombia on April 18, 2018 to consult with invited biodiversity experts for their input on how to best develop the new software with their needs in mind. The workshop included 26 diverse attendees representing Colombian NGOs such as the Wildlife Conservation Society-Colombia, the National University, the University of Eafit, and the University of Antioquia, and representatives from government offices including the Colombian National Biodiversity System and National Parks Colombia. Attendees agreed that the new software will help to improve the quality of planning decisions and biodiversity reporting because with the new software *"it will be easier to do and therefore will be done more often."* We also heard a great deal of appreciation from attendees for being included this early in the software development process.



*"Thank you... It is not common for software developers to include such a broad range of end-users in their decisions."*

Dr. Mary Blair, Dr. Minh Le of Vietnam National University (and former CBC International Graduate Student Fellow), and partners at Rutgers University and the Chinese Academy of Sciences also received a grant from the Prince Albert II of Monaco Foundation (PAM). This grant will support a transboundary research and conservation project focused on protecting key endangered species (such as the Tonkin snub-nosed monkey) in the Mekong region as habitats and threats shift due to a changing climate. As many species are expected to move in response to a shifting climate over time, they face a variety of synergistic threats along the China, Vietnam, and Laos transboundary region, such as human development, land use, and unexploded land mines. This is a high-profile issue for China; following media reports of people and large mammals harmed by land mines in border villages, the Chinese government has started the second largest land mine removal project in the world along its borders with Vietnam and Laos.

Building on longstanding CBC relationships with local researchers, NGOs, and national and local government partners in Southeast Asia, this work will demonstrate the importance of coordinated, evidence-based transboundary conservation management in the face of imminent change. It will advance research while contributing to capacity development with training and new software, and is designed to directly inform conservation management and policy.



*Tonkin snub-nosed monkey*



We continue to support conservation efforts in Cuba, and recently partnered with the Wildlife Conservation Society (WCS) on a convening of Cuban marine protected area professionals that focused on coastal marine monitoring. The training workshop took place in Baconao Biosphere Reserve, Santiago de Cuba, Cuba, November 7-11, 2017 and included Cuban fishers; several government agencies; protected area leaders; NGOs working in southeastern Cuba; and experts from the WCS including our long-time collaborator Kate Holmes. Dr. Ana Porzecanski, CBC Director, participated as an invited expert and facilitator, led activities exploring different social-environmental frameworks and their application within a Cuban context, and presented case studies from the CBC's work on stakeholder engagement.





## Research & Conservation

# Resilient Biocultural Landscapes: Supporting Effective Reef Management Locally and Globally

*The CBC continues to illuminate the fundamental connections between people, their culture, and their environment in the Solomon Islands, fostering more robust natural resource management in areas of high cultural and biological diversity. The research team led by Jaffe Chief Conservation Scientist Dr. Eleanor Sterling in collaboration with several partners—now in its fourth year—has generated valuable new data on the importance of biodiversity to food security and climate change adaptation, and defined new indicators that the participating communities can use to track progress in these areas.*

In Fall 2017, we reported on data collection; the development of books on valued plants and traditional recipes; the development of large-format booklets, created with artist Hara Woltz, summarizing outcomes from the visioning and mapping workshops we conducted in each community; and the scenario-planning workshops we conducted with communities using innovative visual and artistic techniques.

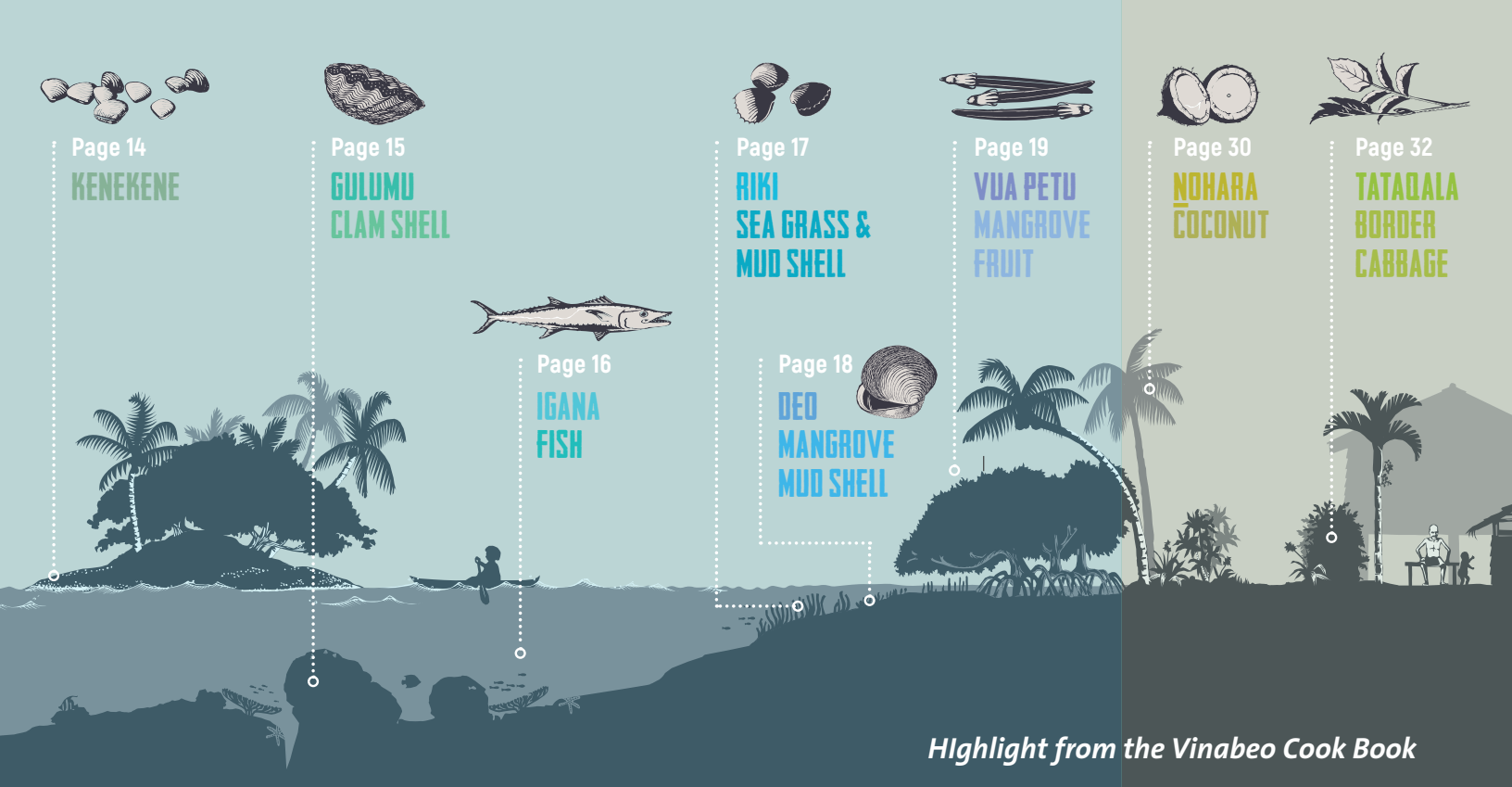
Since then, the team has worked with communities to collect further data, finalize and print products, and discuss the evolution of our work. This work was assisted by a trip from postdoctoral fellow Joe McCarter in February 2018. Activities have included:

- **Practical support** - we have continued providing practical support, to help leaders act in response to biocultural well-being indicators. This has included working with Ministry of Forestry botanist Myknee Sirikolo to complete ranger trainings in forest management. We will also continue to support communities as they recover from damaging commercial logging currently underway in Vavanga and Biche.



- **Further research** - this project is supporting the research of Helen Fellow Camera Ford, by advancing work with community researchers in Kalina (formerly referred to as West Parara) and Zaira on the distribution and impacts of garden pests, identified by communities as a major stressor. We are collecting data on the number of pests, their effects, and the environmental conditions weekly to understand what is driving their abundance and impact.
- **Providing advice** - based on the findings of this work, we are developing policy advice for the Solomon Islands government, focusing on the collection of social safeguards information as part of their ongoing biodiversity monitoring.
- **Finalising products** - we are in the final stages of producing books that document our joint work with these communities, including the *Vinabeo Cook Book*, authored by women in Kalina and detailing traditional plant use. All products will be launched in June 2018.





*Highlight from the Vinabeo Cook Book*

We are also pleased to announce the publication of five peer-reviewed papers on this work. Our high-profile article in *Nature Ecology and Evolution*, which provided a conceptual and theoretical framing for indicators developed through a biocultural approach, is in the top 5% of all research outputs scored by Altmetric and has received significant media attention. In another article in the journal *Environment and Society*, we investigate several existing approaches to indicator design, their use to date, strengths and weaknesses, gaps in methodology, and how this work can be expanded. Finally, we are also developing publications that summarize the biocultural indicator set produced through this work, and compare and contrast it with other indicators of well-being in social-ecological systems. These will be submitted in June 2018.

This project is funded by two grants from the National Science Foundation (NSF), as well as the Tiffany & Co. Foundation, the Gordon and Betty Moore Foundation, Lynette and Richard Jaffe, the Jaffe Family Foundation, and SNAPP: Science for Nature and People Partnership. We are delighted to report that we have received an additional one-year grant from Nia Tero, and will be partnering with them on developing monitoring and evaluation approaches that build on this work and advance indigenous stewardship of vital ecosystems. Ms. Pua’ala Pascua, who recently joined the CBC team and is an expert in biocultural approaches to natural resource management, will be a leader in this effort.

In part due to this work, Dr. Sterling was honored with an invitation to serve as an advisor to an emerging network of leaders focused on the resilience of coral reefs. Convened by the Great Barrier Reef Foundation, Reef Ecologic, and others, the advisory group is working across the Pacific and the Caribbean to help reef communities and managers assess the current ‘state of resilience’ of their reef, identify strengths and weaknesses, prioritize action, and evaluate success. An initial meeting in November 2017 brought together experts from all around the world to assess the draft framework and plan strategically for future exchanges. Dr. Sterling brought the CBC’s expertise in practical, on-the-ground implementation of biocultural strategies to the meeting—contributing to a substantial modification of the draft framework.

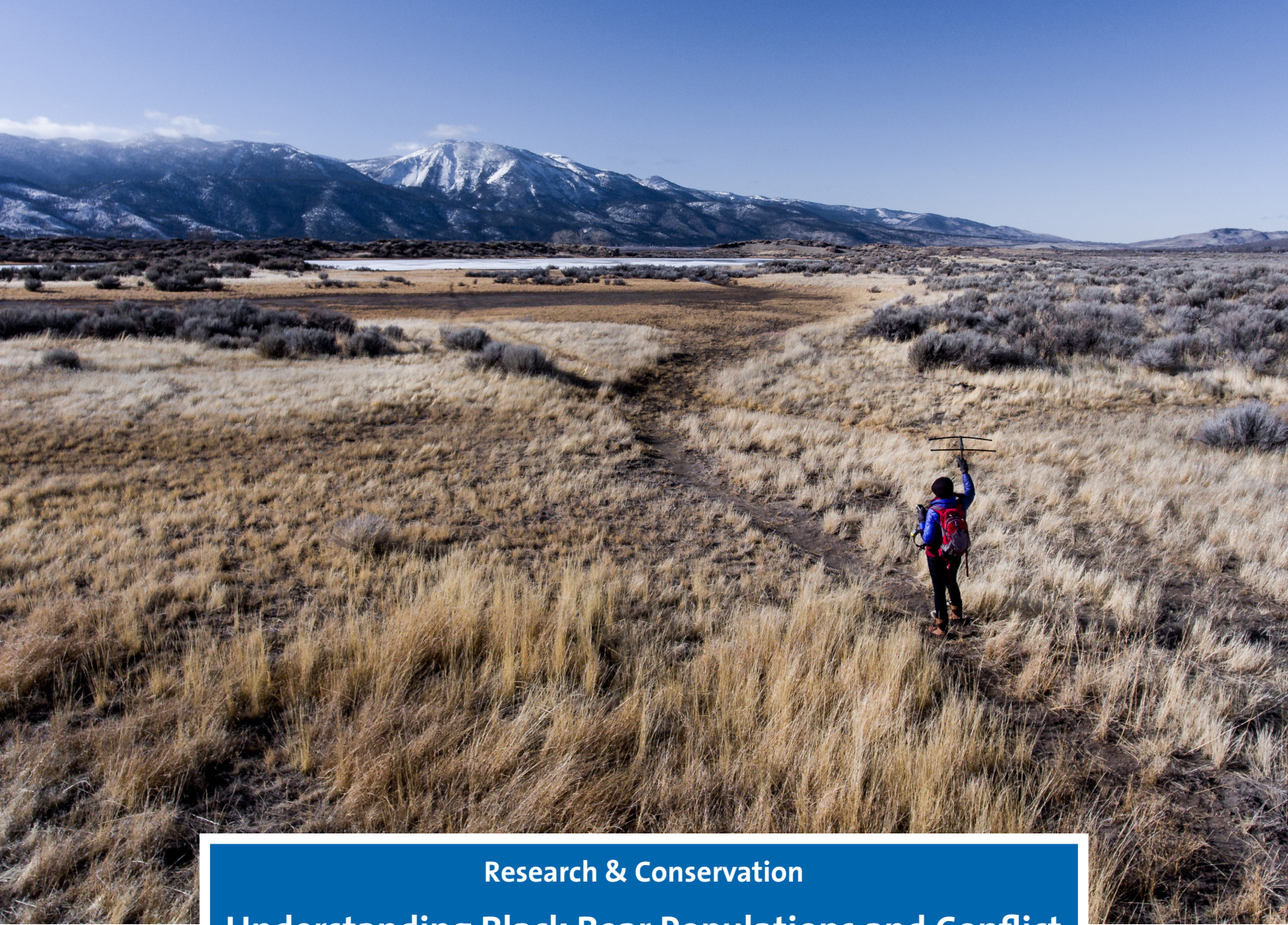


Research & Conservation

## Wetland Dynamics and Flamingo Habitat Use in the Andean Plateau

CBC Associate Director Dr. Felicity Arengo co-lead an expedition to the Andes of Catamarca Province, Argentina, to monitor flamingo and waterbird populations in the saline wetlands where mining activity has increased over the past 18 months. This time, the team was accompanied by staff from the provincial Secretary of Mining, so they could visit the mining camps where companies have set up operations in several of the wetlands we have been monitoring over the past 20 years. Several of the companies are wrapping up their exploration phase and will be evaluating feasibility for exploitation over the next few months. During the trip, the team also collected water samples from 33 wetlands to begin looking at connectivity among watersheds, taking a regional approach to the waterscapes that may be affected by increased mining in a water-stressed area.

Dr. Arengo has formed an interdisciplinary research team to better understand how the human and natural aspects of this system are coupled, with collaborators from the University of Massachusetts, University of Alaska Anchorage, Columbia University, and institutions in Argentina. They hope to obtain funding to lead studies of the linkages between hydrology, wetland ecosystems, and human livelihoods in a social-ecological system that depends on wetlands facing growing pressures from global drivers like climate change and industrial-scale mining.



Research & Conservation

## Understanding Black Bear Populations and Conflict with Humans

Postdoctoral Fellow Dr. Rae Wynn-Grant has continued her long-term research on black bear behavior and ecology in the Lake Tahoe Basin in Western Nevada. This February, she returned to her study site to collect location points of black bear dens. Female black bears begin hibernation in late November or early December and give birth to cubs in January. Dr. Wynn-Grant and her colleagues routinely visit den sites in late February when cubs are eight weeks old to tag them for future study and check the GPS collar of the mother bear. The February field season resulted in the discovery of three bear dens, although no new cubs were present.

After seven years of working on black bear conservation and management in Nevada, Dr. Wynn-Grant has recently established connections with the WCS Adirondacks program. Together with the WCS, she will lead a study to compare the patterns and drivers of human-bear conflict in two ecosystems—the Lake Tahoe Basin, and the Adirondacks in upstate New York. This long-term project will draw on more than 10 years of human-bear conflict records, and aims to understand the similarities and differences between conflict locations; habitats; frequencies; and bear demographics, while also recommending site-specific mitigation strategies and testing their impact.

# LESSONS IN CONSERVATION

STUDENT  
LEARNING  
ISSUE

VOLUME 8  
JANUARY 2018



**Capacity Development**

**Network of Conservation Educators and Practitioners**

Our signature program dedicated to developing capacity for conservation, the Network of Conservation Educators and Practitioners (NCEP) continues to support teaching and lead training. In November 2017, NCEP launched a new online database for its extensive collection of open-access conservation resources for teaching and learning, available at [ncep.amnh.org](http://ncep.amnh.org). This new home for NCEP's module collection is easier to navigate, and since its launch, over 1,800 new and returning visitors to the site from 109 countries have downloaded module components 5,100+ times.

In January 2018, the NCEP editorial team published the eighth edition of *Lessons in Conservation*, NCEP’s official journal. This “Student Learning” issue features teaching and learning assessment materials developed as part of NCEP’s recently completed NSF-funded research on teaching conservation science. This suite of materials was developed to promote and evaluate the development of specific skills in students—oral communication, data analysis, and critical thinking—and can be applied in a variety of academic or training courses as well as for independent learning.

A new online course, “Ecology: Ecosystem Dynamics and Conservation,” was developed by NCEP and the National Center for Science Literacy, Education and Technology (NCSLET), part of the Museum’s Education Department, for the Museum’s popular online teacher professional development series, Seminars on Science. The six-week course will strengthen educators’ understanding of ecological principles, while providing resources and approaches for teaching a new generation of students about the interdependence of ecosystems and humans. Dr. Ana Luz Porzecanski and Dr. Sterling are also featured in video lectures on the future of conservation and biocultural approaches to conservation. The course ran from October to November and was highly successful. It is now in its second iteration, with NCEP Manager Dr. Suzanne Macey acting as lead instructor.

In order to reach a broader audience, the course was successfully adapted by NCSLET for Coursera as a massive open online course (MOOC). It launched on March 12 and will run for six consecutive weeks, and has already reached over a thousand visitors, with 254 active learners from 70 countries.

Both courses were supported by the Museum and a grant from the Howard Hughes Medical Institute (HHMI) and feature Museum, NCEP, and HHMI educational resources.

The screenshot shows the Coursera course page for "Ecology: Ecosystem Dynamics and Conservation". At the top, there is a navigation bar with the Coursera logo, a search bar, and links for "For Enterprise", "Log In", and "Sign Up". Below the navigation bar, the course title "Ecology: Ecosystem Dynamics and Conservation" is displayed in large white text against a background image of elephants in a savanna. To the left of the main content, there is a sidebar menu with options: "Overview", "Syllabus", "FAQs", and "Creators". Below the menu is a blue "Enroll" button with the text "Starts Apr 09" and a link to "Apply for Financial Aid". The main content area includes a description of the course: "About this course: This course is an introduction to ecology and ecosystem dynamics using a systems thinking lens. Through a case study on Mozambique's Gorongosa National Park, learners will explore how scientists study ecosystems, and investigate the complex array of factors that inform management efforts. At the end of the course, learners will be able to grapple with real-world conservation questions, such as". Below the description is a "More" link. Further down, the course creators are listed as "American Museum of Natural History, Howard Hughes Medical Institute", with logos for both organizations. At the bottom, there is a circular profile picture of Ana Luz Porzecanski and the text "Taught by: Ana Luz Porzecanski, Director Center for Biodiversity and Conservation".



## Capacity Development

### Advancing Conservation Education: Thinking Big About Food

*The CBC continues its partnership with Columbia University to convene educators and researchers analyzing the intersections between food, our bodies, and our environment and to develop teaching and learning materials that use food systems as the setting for practicing critical thinking and inquiry.* Through this new set of teaching resources, we hope to help students better understand when, where, and how to act to make a difference when facing complex problems. The project encompasses the development of three undergraduate courses: “Food and the Body;” “Food, Ecology, and Globalization;” and “Food, Public Health, Policy, and Economics.” Dr. Sterling, Dr. Sharon Akabas—a nutritionist from the Columbia University College of Physicians and Surgeons—and CBC Biodiversity Scientist Erin Betley taught “Food, Ecology, and Globalization” in the Fall of 2017 to pilot materials and assessment tools. In this broad survey course, 23 students applied the tools of systems thinking to understand the relationships between our food choices, ecology, and globalization. The team received a Provost’s award to work with the Columbia Center for Teaching and Learning (CTL) and are featured in a “Spotlight” video developed by CTL. Dr. Sterling and Dr. Akabas are the first faculty team to be highlighted in this way by CTL.

As part of our collaborative NSF grant with Michigan State University and Rutgers University, the course provided a “laboratory” for piloting innovative software and classroom instruction to investigate how students can best learn systems thinking and systems modeling. New exercises and class materials generated through this project will become part of the NCEP collection. In February, the teaching team for the “Food, Ecology, and Globalization” course presented a poster on the course’s outcomes at Columbia University’s 2018 Celebration of Teaching and Learning symposium.





## Capacity Development

# Building a Stronger Future for Conservation Science

To encourage excellence, diversity, and inclusion in conservation, the CBC is devoted to promoting the recruitment, achievement, and success of students and early-career professionals from groups historically underrepresented in the field. We lead a number of activities to advance these goals, under our Inclusive Conservation Community Initiative (ICON). This fall, our activities included:

- Mentoring of four high school students, two undergraduate students, and two graduate students.
- Creating and piloting media to raise the profile of conservation biology in underrepresented communities.
- Launching a suite of resources and materials for those seeking to enter or advance in the conservation field, from our highly successful SCCS-NY Careers in Conservation workshop. We are excited to add new resources soon, including a guide to inclusive undergraduate and graduate programs in conservation biology and a how-to guide for students applying to these programs.
- Dr. Sterling is collaborating with members of the New York-based Women in Natural Sciences Chapter of the Association for Women in Science on an initiative to raise awareness of previously unknown change-makers in conservation and museum-based natural sciences in both a historical and contemporary context. *Making the Unseen Visible: Untold Stories of Change Makers in Conservation and Natural History* will work to connect the Museum with other institutions around the world to foreground stories to serve as inspirations to current and future generations of conservationists.



## Convening & Connecting Guiding Global Policy

*As we work to advance conservation action and bridge local and global scales in conservation, we continue to connect with the international arena and share lessons from our work with global initiatives. Dr. Sterling has been leading these efforts, which recently included an invitation to join a special Task Force of the World Commission on Protected Areas of the IUCN (International Union for Conservation of Nature) that is providing guidance on how community-led protected areas can help achieve targets of the global Convention on Biological Diversity (CBD). In particular, the Task Force will focus on Target 11 which calls for “at least 17 percent of terrestrial and inland water areas and 10 percent of coastal and marine areas” to be protected. This past November, together with CBC specialists Hellin Brink and Pua’ala Pascua, Dr. Sterling participated in meetings of the Convention devoted to drafting updated goals for beyond 2020. The Task Force published an important set of guidelines for practitioners and policy-makers in January 2018. We are pleased to share that our work in Zaira, in Western Province, Solomon Islands, has been selected as a case study, and will be shared globally. A case study on our work in the Solomon Islands will also be featured by IUCN’s World Commission on Protected Areas Specialist Group on Cultural and Spiritual Values of Protected Areas, with case studies and examples from around the world.*

Dr. Sterling has also been leading CBC efforts to engage with the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). IPBES, like the Intergovernmental Panel on Climate Change (IPCC), produces assessment reports; however, while IPCC focuses on the science of climate change, IPBES assesses the state of the planet’s biodiversity. These assessment reports synthesize western scientific knowledge and indigenous and local community knowledge. The CBC was invited to review several sections in the global assessment, and Dr. Sterling worked with other specialists to ensure just and equitable representation and treatment of indigenous and local knowledge in these assessments at the IPBES plenary held in Colombia in March 2018.

Last fall, we shared the launch of a new partnership with UNESCO and the Convention on Biological Diversity on the interlinkages between biological and cultural diversity. That work continues with a collaboration engaging a range of actors from around the world in an *Action Group on Knowledge Systems and Indicators of Well-being*. The Action Group aims to create a community of practice to inspire action and promote exchange regarding the connections between nature and culture, focusing on approaches to indicators that encompass both human and ecological well-being. On April 21-22, the CBC and its partners hosted the first Action Group meeting at the Museum. The event brought together over 80 participants involved with the protection of nature and culture (including representatives from indigenous and local communities, policymakers, researchers, and conservation professionals) for a cross-cutting exploration of indicators of well-being across multiple regions, sectors, and scales.

As part of the ongoing work of the *Action Group on Knowledge Systems and Indicators of Wellbeing*, the CBC and partners hosted a side event during the 17<sup>th</sup> Session of the United Nations Permanent Forum on Indigenous Issues. Bringing together a diverse group of representatives from indigenous and local communities, research institutions, and national and international policy arenas, the event provided an opportunity for dialogue and exchange among different stakeholders around indicators that encompass both human and environmental well-being.





## Convening & Connecting Exhibitions and Outreach

The Museum held a highly popular science and arts festival on April 22 to celebrate Earth Day. Among many other events, EarthFest featured The Chelsea Symphony performing award-winning composer John Luther Adams’ majestic orchestral work *Become Ocean*, a thrilling exploration of depth, turbulence, eerie silence, and—ultimately—enveloping calm. Dr. Porzecanski was the scientist host for the event.

Dr. Porzecanski acted as an advisor for and was featured in a recent PBS NewsHour two-part series that aired in October 2017. The pieces explored why Cuba is home to a bounty of rare species, and how it can protect ecosystems while profiting from tourism. Science correspondent Miles O’Brien led the discussion with Dr. Porzecanski on location at the Zapata Wetlands in Cuba. Dr. Porzecanski was also invited to give three public talks at the Cuban Arts Festival at the Kennedy Center in Washington, D.C. this coming May, where several items from the *¡Cuba!* special exhibition will be on display.

In keeping with the CBC’s efforts to reach a broad audience, Dr. Sterling served as a science advisor to an independent film production company, Archipelago Films and Arise Media, which produced a 3-D film on connecting to nature. “Backyard Wilderness” takes a year-long look at a young family and their relationship to the shifting seasons of biodiversity in their backyard. Encompassing some stunning wildlife footage (including days-old wood ducks parachuting from their nest at the top of the canopy to start their lives on the ground), the movie was released in March 2018.

Several CBC staff authored a chapter titled “The Essential Role of Museums in Wildlife Conservation,” as part of the book *The Future of Natural History Museums*. The chapter provides examples where museum collections, research, public programs, and capacity development initiatives had made important contributions to conservation on the ground.