

# WILD NATURE INSTITUTE

## 2022 ANNUAL REPORT



# From the Founders

In 2022, the Wild Nature Institute continued our **science, education, and advocacy** for wildlife in savannas of East Africa and forests of the western U.S.A. Both regions are biologically rich but threatened by human activities.

We completed another year of the **world's largest study of giraffes** using non-invasive photographic identification and DNA sampling. Together with our research partners around the world, in 2022 we published 4 scientific papers about giraffes and an academic book about human-wildlife co-existence in the Tarangire Ecosystem.

Our **Celebrating Africa's Giants education program** reached ever more communities in Tanzania. Children learned about wildlife, ecology, and conservation in their classrooms; celebrated World Giraffe Week, World Ranger Day, and Elephant Fun Day; and visited their backyard national parks for the first time.

In our **forest protection work**, we published research showing that logging is pervasive in burned Northern Spotted Owl territories, so logging likely triggers abandonment—not wildfire.

We shared our knowledge at conferences, schools, webinars, and media outlets throughout the year.

**We could not have accomplished our goals without the support of our donors and partners. We are deeply grateful.**

Dr. Derek E. Lee and Dr. Monica L. Bond  
Founders and Principal Scientists



# Meet The Wild Nature Institute!



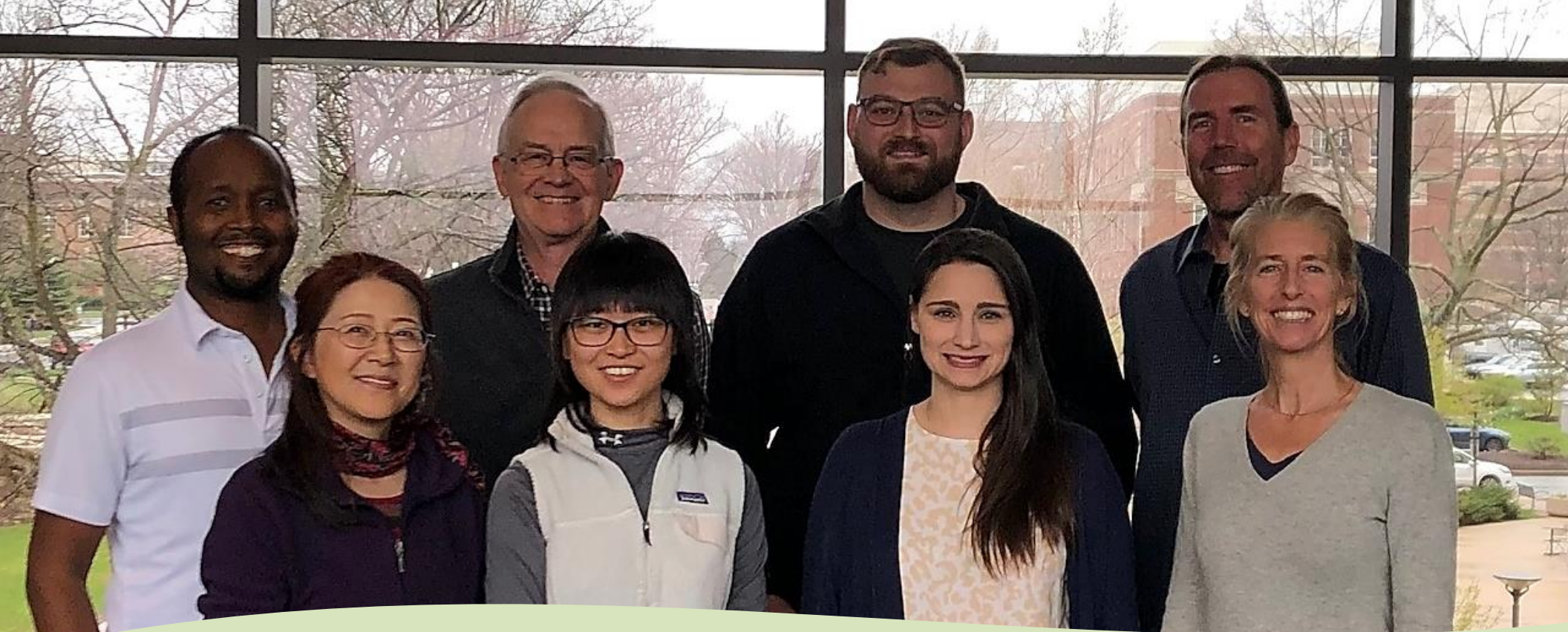
**Team Twiga Tanzania (from left to right):**

Dr. Derek Lee, Principal Scientist

James Madeli, Giraffe Research Coordinator

Veila Makundi, Anne Innis Dagg Education Coordinator

Dr. Monica Bond, Principal Scientist



# Presenting Team Twiga Penn State!

**Team Twiga Penn State conducts genetic studies of Masai giraffes.**

From left to right: Dr. George Lohay, Dr. Lan Wu-Cavener, Dr. Doug Cavener, Xiaoyi Hou, David Pearce, Rebecca Bourne, Dr. Derek Lee, Dr. Monica Bond

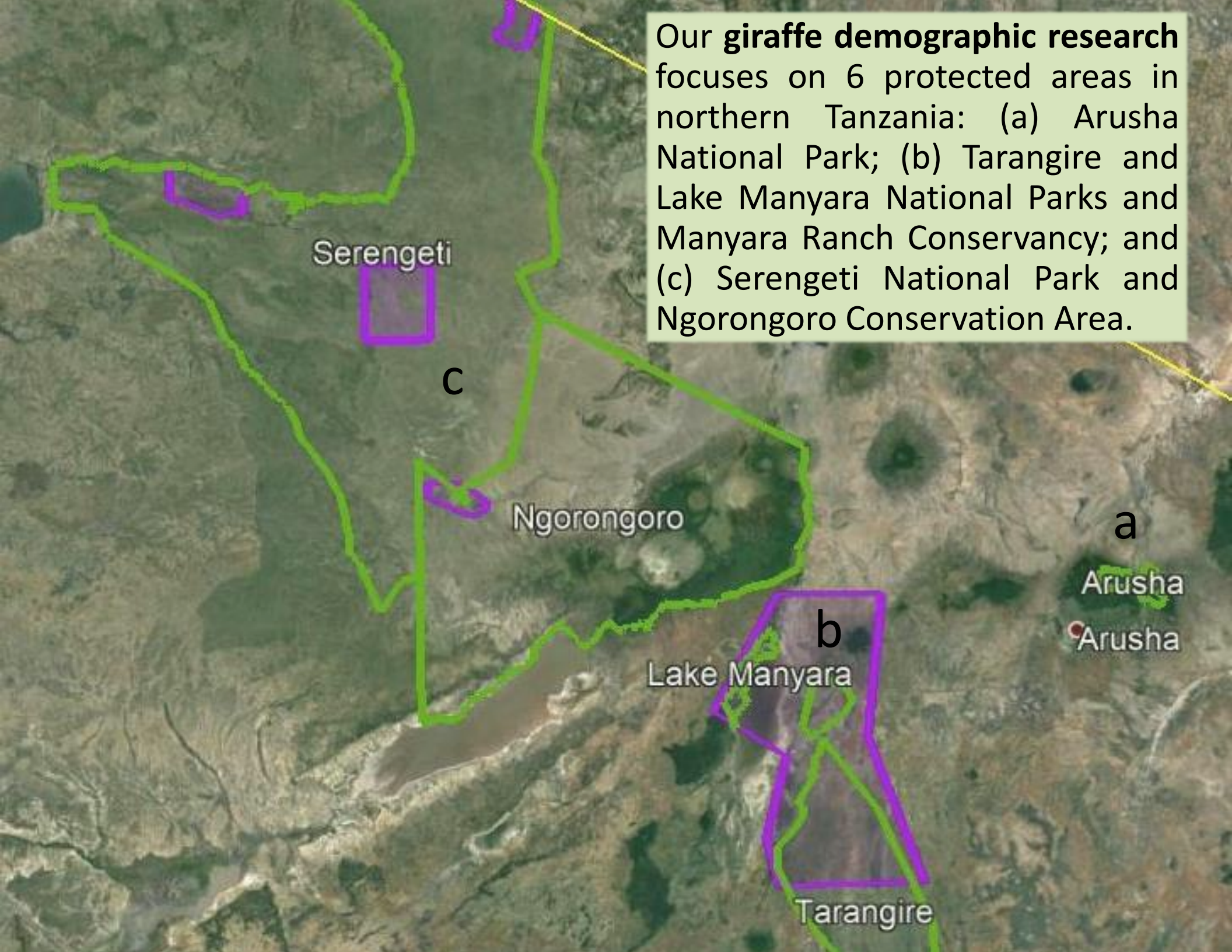


# Masai Giraffe Conservation Science

**Our Masai giraffe conservation science seeks to understand where giraffes are doing well and where they are not, and why, and to protect and connect the places most important for giraffes.**

Wild Nature Institute is conducting the world's largest individual-based study of giraffes. We use photographs of their unique spot patterns to track thousands of giraffes over their lifetimes to understand their births, deaths, and movements. We also collect DNA for a deeper understanding of population gene flow and structure, and the evolution of their traits.

Our giraffe demographic research focuses on 6 protected areas in northern Tanzania: (a) Arusha National Park; (b) Tarangire and Lake Manyara National Parks and Manyara Ranch Conservancy; and (c) Serengeti National Park and Ngorongoro Conservation Area.



Serengeti

c

Ngorongoro

a

Arusha

Arusha

b

Lake Manyara

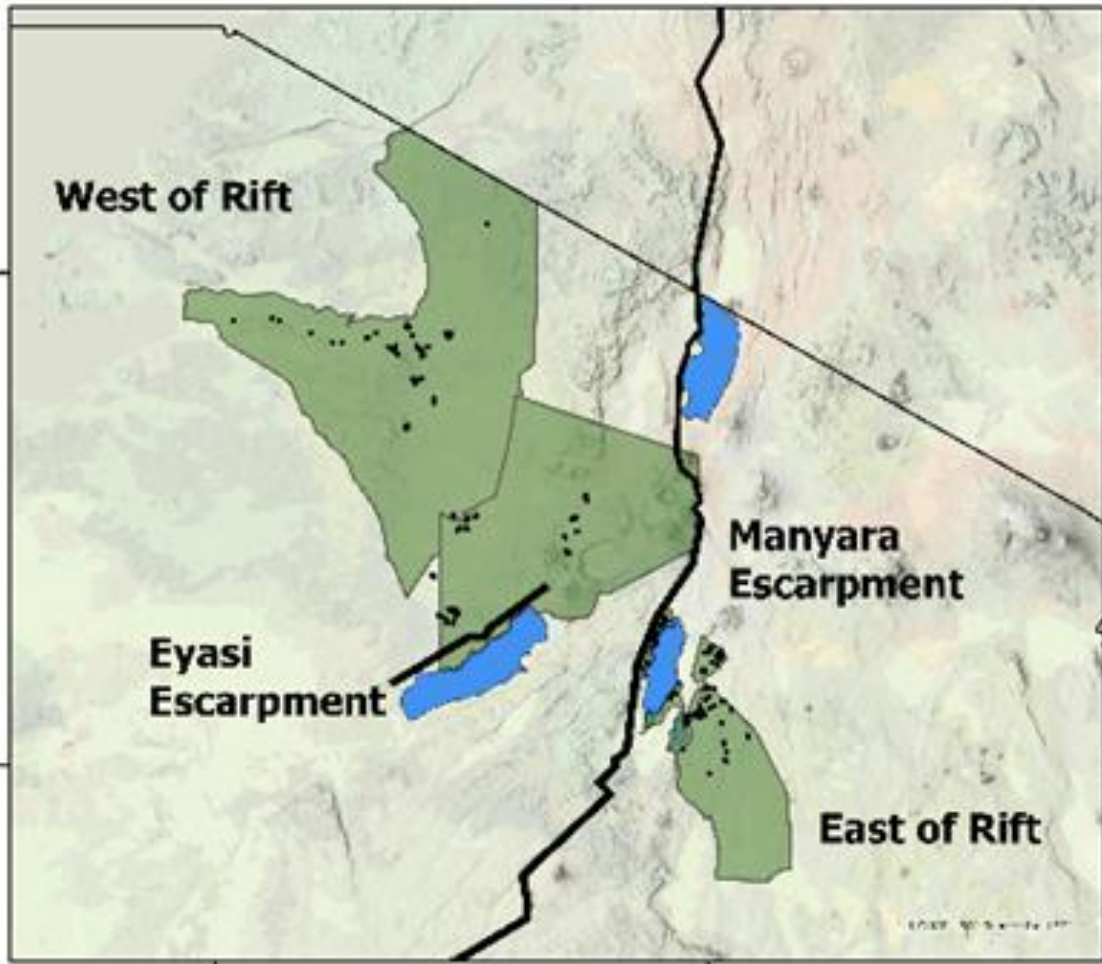
Tarangire

To date **we have completed** 71 giraffe photographic surveys in Tarangire, 20 in Serengeti-Ngorongoro, and 12 in Arusha National Park.



## Big Data for Big Animals

We use an automated program to crop the photos, and a pattern-recognition program to identify each giraffe from their unique spots.



Black dots are where DNA samples of Masai giraffes were collected in Serengeti-Ngorongoro and Tarangire ecosystems



**In our giraffe genetic research, we are collecting dung and tissue samples to learn about population genetic flow and genetic relatedness, and to map the genes driving spot pattern variation.**



James Madeli and Emmanuel Kimaro conduct giraffe photographic surveys in Arusha National Park.



**We are increasing the capacity of Tanzanians to study and protect their national animal and ensure the long-term sustainability of our Masai giraffe conservation science with training and financial support.**

# In 2022, together with our colleagues across the globe we published four scientific articles about giraffes:

D.E. Lee, G.G. Lohay, D.R. Cavener, & M.L. Bond. 2022. “Using spot pattern recognition to examine population biology, evolutionary ecology, sociality, and movements of giraffes: a 70-year retrospective.” Mammalian Biology.

K. Morandi, A.K. Lindholm, D.E. Lee, & M.L. Bond. 2022. “Phenotypic matching by spot pattern potentially mediates female giraffe social associations.” Journal of Zoology.

N.L. James, M.L. Bond, A. Ozgul, & D.E. Lee. 2022. “Trophic processes constrain seasonal ungulate distributions at two scales in an East African savanna.” Journal of Mammalogy.

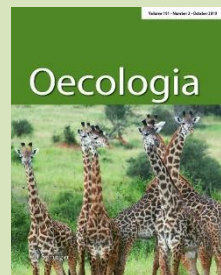
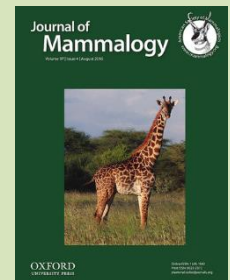
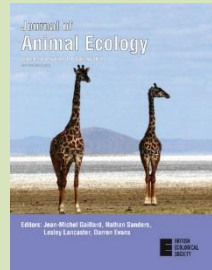
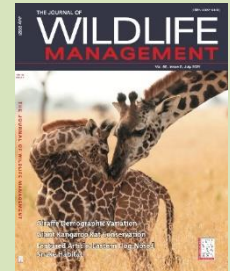
M. Levi, D.E. Lee, M.L. Bond, & A.C. Treydte. 2022. “Forage selection by Masai giraffes (*Giraffa camelopardalis tippelskirchi*) at multiple spatial scales.” Journal of Mammalogy.

**Our results inform conservation and land management and help ensure a future for giraffes.**



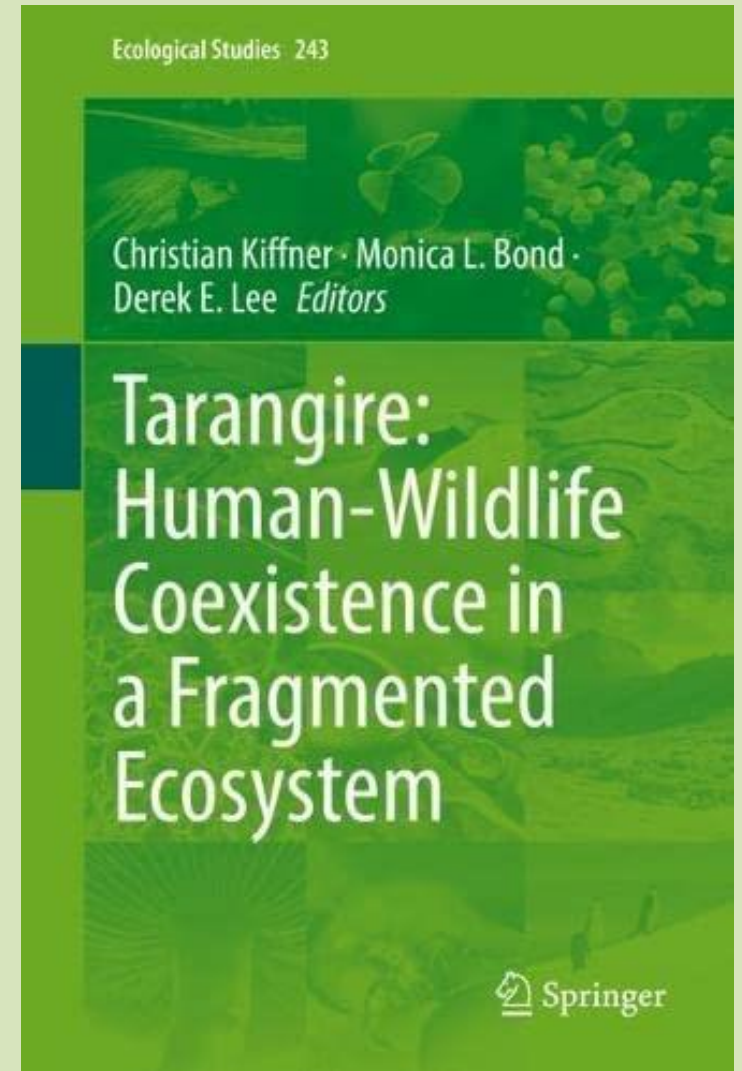
# What We Learned About Giraffes This Year:

- We reviewed 70 years of research on giraffes based on identifying individuals by their unique spot patterns (Lee et al.). We describe how recognizing individuals by the patterns allows scientists to learn about births and deaths, movements, social structure, and health. We provide recommendations for conservation actions based on what we have learned from the past 7 decades of research, so that we can safeguard a future for this magnificent mega-herbivore.
- Spot traits were individually variable among adult female giraffes in the Tarangire Ecosystem, and females showed stronger associations with other females that had similar spot shapes (Morandi et al.)
- Masai giraffe distribution in Tarangire was less constrained by water (they were not closer to rivers and waterholes during the dry season than the wet seasons) but more constrained by the seasonal presence of preferred food such as *Vachellia drepanolobium* in the long rains (James et al.)
- A native bush-encroaching shrub species called Sickle Bush (*Dichrostachys cinerea*) is disliked by livestock keepers and rangeland managers, but loved as forage by wild Masai giraffes (Levi et al.)



# Human-Wildlife Coexistence

Wild Nature Institute was pleased to **produce a book** co-edited by WNI scientists Dr. Derek Lee and Dr. Monica Bond, along with our colleague Dr. Christian Kiffner, published by Springer Nature. We pulled together academics studying humans and wildlife in the Tarangire Ecosystem and asked them to contribute chapters. Tarangire hosts hundreds of thousands of people, millions of livestock, large mines, booming towns, two major tarmac roads, and a patchwork of agricultural fields—and yet still supports one of the most significant long-distance migrations of wildlife remaining in the world, much of it taking place on community land. It also is home to one of the most important populations of giraffes in Tanzania, and therefore in the world. Wildlife numbers have declined historically, but the mere fact that many populations are stable, and some are increasing, despite all the odds, demonstrates that humans and wildlife can indeed coexist.



# Giraffe Science: Building Collaborations

We collaborate with institutions around the world to maximize the impact of our research and education programs.

- **Zoos:** Social scientists from The Living Desert are helping us assess the ways our education is influencing community knowledge, attitudes, and behaviors. Zoos around the USA provide giraffe photographs and DNA samples for our spot-pattern and giraffe growth research.
- **Penn State University:** We are studying the genetics of giraffes with researchers from the Eberly College of Science.
- **University of Zurich:** We are working with the Population Ecology group to quantify giraffe growth rates and study climate effects on giraffe demography.
- **Estación Biológica de Doñana:** We are collaborating with students and researchers to understand interactions between giraffes and other savanna ungulates.



# Tarangire Ungulate Observatory “TUNGO”

The Wild Nature Institute’s landscape-level population research program for ungulates (hoofed mammals)



Grant's gazelle



Kirk's dik-dik



Impala



Common waterbuck

The savanna habitat of the Tarangire Ecosystem is a **global hotspot for ungulates.**

Our TUNGO surveys provide reliable data for scientific management, land-use planning, anti-poaching enforcement, and conservation. Graduate students from **University of Zurich** and **Estación Biológica de Doñana** use our TUNGO data to analyze ungulate population trends, and to study the effects of climate change on demography.

# Outreach and Advocacy

We presented our giraffe conservation science at several forums in 2022

We presented our giraffe research to 19 students at the School for Field Studies in Tanzania

We were interviewed on the Solve It! For Kids podcast during World Giraffe Week

We presented our giraffe research to 18 students at the School for Field Studies in Tanzania

March

April

June

July

October

November

We talked about giraffes to kindergarteners and first graders at the Global Idea School

We presented our giraffe research and education to 90 students at Penn State

We presented our giraffe research to the Tanzanian wildlife agencies

We spoke about giraffes to 20 kids at the Sac Zoo summer camp

We shared our giraffe research to 30 scientists at the Estación Biologica de Doñana



## Our Celebrating Africa's Giants Education Program Has 4 Elements:

- Classroom Education
- Tree Planting and Care
- School 'Fun Days' Celebrating Wildlife
- National Park Visits



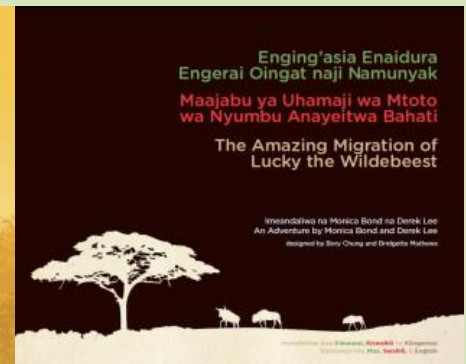
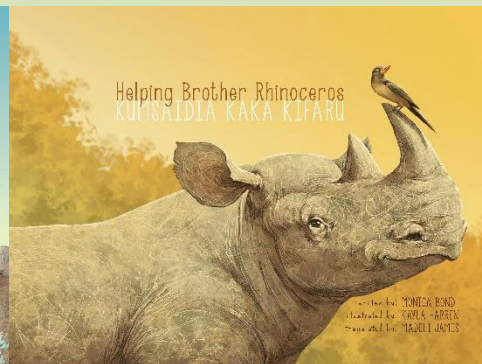
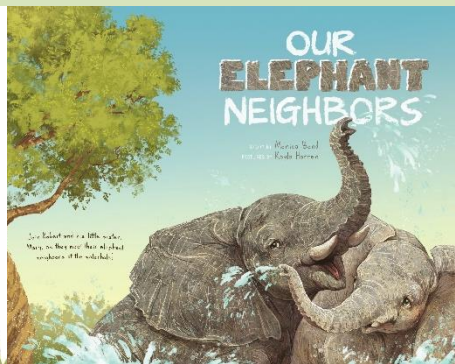
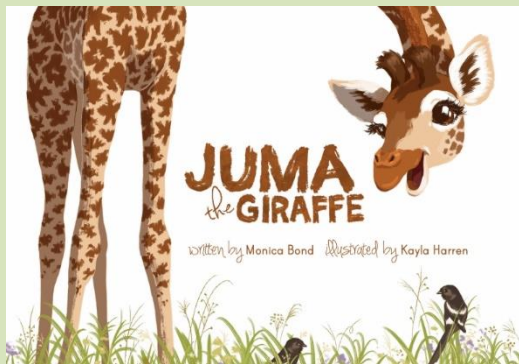


# Environmental Education



## CELEBRATING AFRICA'S GIANTS: Classroom Education

- Four full-color bilingual (Swahili and English) story books with associated lesson plans.
- Two activity books in Swahili.
- Giraffe, elephant, rhinoceros, and wildebeest educational posters.
- A website – [www.AfricasGiants.org](http://www.AfricasGiants.org) – where materials, lesson plans, and activities are freely available.
- Tanzanian educator training on how to develop and implement innovative, effective, conservation-oriented teaching strategies.



# Environmental Education



## CELEBRATING AFRICA'S GIANTS: Classroom Education

During 2022, Wild Nature Institute's Education Coordinator, Veila Makundi, visited **15 schools** in the Tarangire region a total of **126 times**, repeatedly teaching a total of **1,097 different children**. This enables us to build important long-term relationships with people living around the parks where we study giraffes.



# Environmental Education



## CELEBRATING AFRICA'S GIANTS: Wildlife Fun Days

Wild Nature Institute celebrated **World Giraffe Week** June 21-24. We hosted a sports tournament among six schools, where girls played netball and boys played soccer and volleyball, and children sang a poem about giraffes. The event was attended by Ward Education Coordinators from the Monduli District, the Lake Manyara National Park Outreach Officer, and teachers from Manyara, Kigongoni, Mto wa Mbu, Majengo, St. Jude, and Baraka schools.

**More than 3,000 students participated in the World Giraffe Week celebration!**



# Environmental Education

## CELEBRATING AFRICA'S GIANTS: Wildlife Fun Days



Wild Nature Institute hosted *Elephant Fun Day* on November 11. We held the event at Sasa School, which teaches children with physical disabilities and those from poor and disadvantaged families. There were sports, songs, poems, art, drama, and a trash-clean-up at Lake Manyara National Park.

**More than 500 people attended the event (450 students and 70 staff)!**



# Environmental Education

## CELEBRATING AFRICA'S GIANTS: World Ranger Day



Wild Nature Institute appreciates the critical work that park rangers do to protect our precious wildlife. In honor of **World Ranger Day** on July 31, schoolchildren in our education program personally delivered handwritten thank you letters and a special poster to rangers at Lake Manyara National Park. Wild Nature Institute scientists have been studying giraffes in this park for the past 10 years. These schoolchildren live around the park, and the rangers were surprised and happy to be appreciated in this way by the local community.

**We thank park rangers for dedicating their lives to saving giraffes and other wildlife!**



# Environmental Education

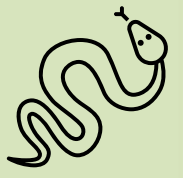


## CELEBRATING AFRICA'S GIANTS: National Park Visits

Wild Nature Institute took two groups of students—35 from Manyara Secondary and 35 from Esilalei Primary—to **visit Tarangire National Park** on November 26 and 27. None of the children had ever visited a national park before, and this was a wonderful opportunity to see (using binoculars) and learn about wildlife and ecology in a fun and relaxed way. A professional safari guide taught them about the park and animals, and we surprised the kids by bringing them on a tour of Tarangire Safari Lodge so they could see where visitors from all over the world come and appreciate this spectacular park. We also awarded last year's park visit essay winners with new school uniforms and a giraffe sculpture.



# Environmental Education



## CELEBRATING AFRICA'S GIANTS: Saving People, Saving Snakes

In December, Wild Nature Institute rolled out our new education initiative: ***Saving People, Saving Snakes***. We developed a package of innovative materials to teach schoolchildren about snake ecology and the challenges of living with snakes—including how to avoid conflicts and what to do when bitten—that will inspire action to protect both people and snakes.

**Special thanks to Mirthe Aarts and Dickson Katana.**

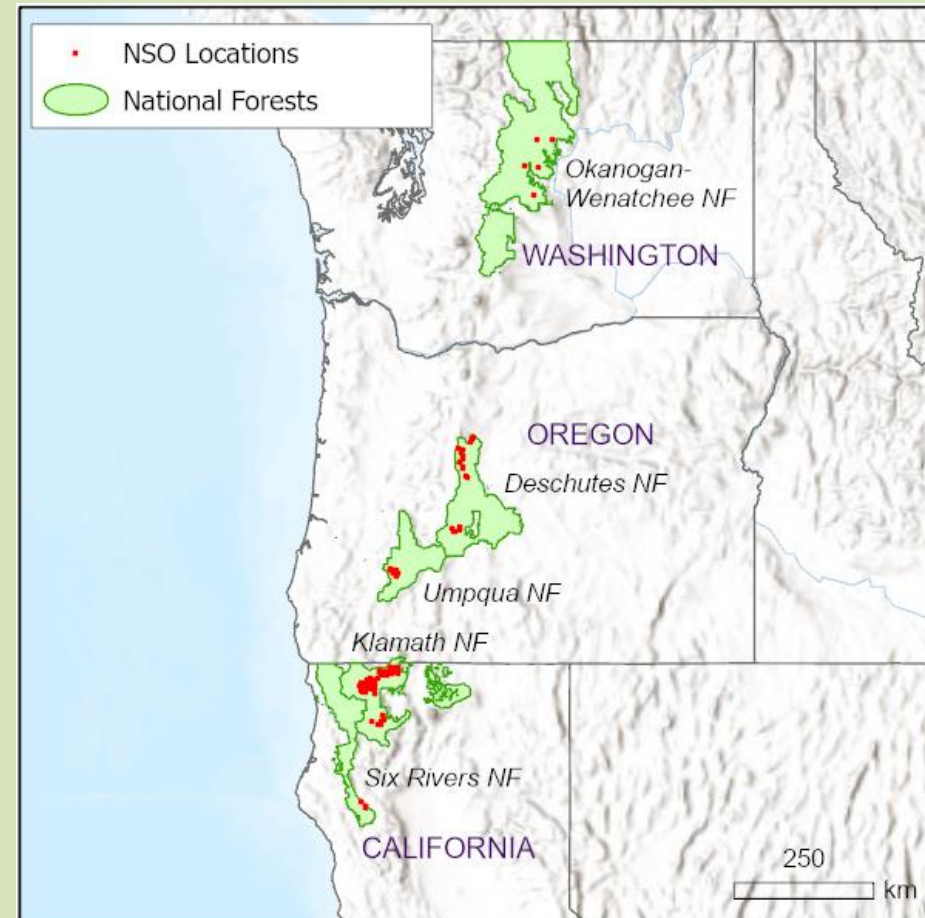
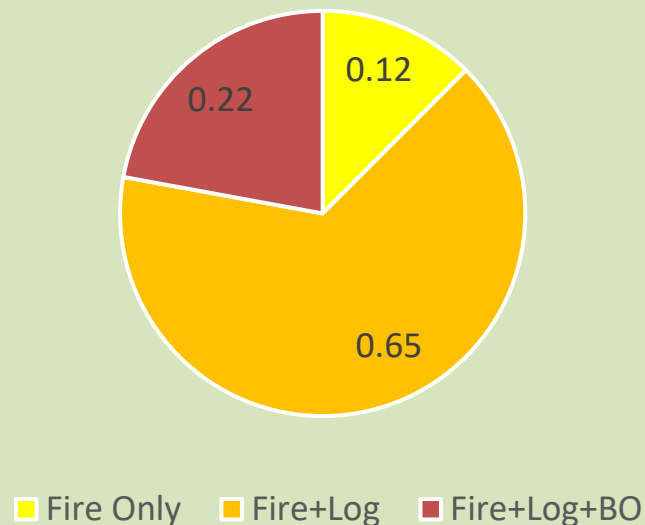


# Snag Forest Campaign

**We study wildfire and wildlife to protect biodiversity in burned forest habitats.**

Together with our colleagues, we published a study in the journal *Forests* documenting the massive extent of logging and Barred Owls in Northern Spotted Owl territories that had been burned intensively by wildfire. Our results indicate that logging and invasive Barred Owls – rather than wildfire – is likely driving Northern Spotted Owl declines.

Logging and Barred Owls In Northern Spotted Owl Sites Affected By Wildfire





# Outreach and Advocacy

We advocated for Snag Forest Protection in two webinars, the John Muir Project's *Understanding the Science* series and the Forest Carbon Coalition's *Setting the Stage: Distinguishing Science from Falsehoods*.



The graphic features a dark green background with a silhouette of a large evergreen tree on the right. In the top left corner is the John Muir Project logo, which includes a bird perched on a hat and the text 'JOHN MUIR PROJECT'. The main title 'UNDERSTANDING THE SCIENCE' is written in large, white, sans-serif capital letters. Below it, in smaller white text, is 'Episode 3 is Brought to You by The John Muir Project of Earth Island Institute'. A white, curved banner contains the webinar title and description in a typewriter-style font. Three circular portraits of the panelists are arranged on the left side of the banner.

**UNDERSTANDING THE SCIENCE**

Episode 3 is Brought to You by  
The John Muir Project of Earth Island Institute

**Biodiversity in the Burn:  
The Remarkable Ecology of Snag Forest Habitat**

Join our panel of independent scientists as  
they discuss their work in Wildfire Ecology, Biodiversity, & Post Fire Habitats

# Our Major Donors and Supporters

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**Tierpark Berlin · Tulsa Zoo · Sacramento Zoo · The Living Desert**

Save the Giraffes · Columbus Zoo · Cincinnati Zoo · Zoo Miami

Como Park Zoo · Roger Williams Park Zoo · Anne Innis Dagg Foundation

&Beyond Asilia Africa Tarangire Safari Lodge Nomad Tanzania Matembezi

*Plus a big thank-you to all Wild Nature Institute's wonderful individual donors*

## Our Partners

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**Pennsylvania State University**

Estación Biologica de Doñana

Conservation Congress

John Muir Project

Wild Heritage

Los Padres Forest Watch

PAMS Foundation

**University of Zurich**

Manyara Ranch Conservancy

Tanzania National Parks

Tanzania Wildlife Authority

Tanzania Wildlife Research Institute

Ngorongoro Conservation Area Authority

Nelson Mandela AIST

# Statement of Activities 2022

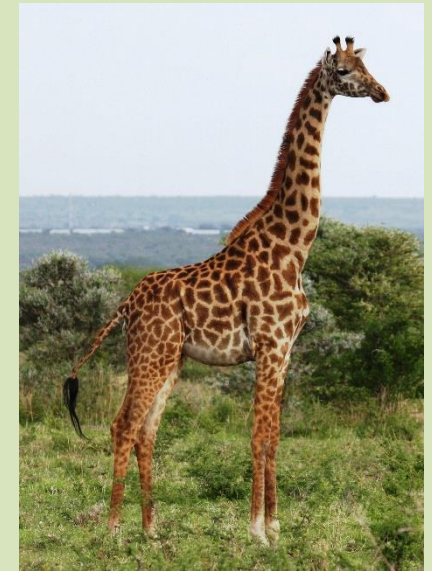
## INCOME

Grants from Foundations	\$ 109,215
Individual Donations/Family Trusts	\$ 20,031
Contracts	\$ 45,000
Other (Travel Reimbursements)	\$ 436
<b>Total Income</b>	<b>\$ 174,682</b>

## EXPENSES

Field Research (Permits, Vehicles, Equipment, Food and Fuel, Tanzanian Field Assistants, Lab Fees)	\$ 63,433
Travel	\$ 30,387
Conferences/Meetings/Membership Fees/Classes	\$ 1,603
Services (Contract Research, Education Materials Design & Illustration, Printing Books)	\$ 21,730
Mailing and Office Expenses (Rent, Phone, Utilities)	\$ 27,841
<b>Total Expenses</b>	<b>\$ 144,994</b>

Starting Balance (carryover from 2021)	\$ 120,772
Income - Expenses	\$ 29,688
<b>Ending Balance</b>	<b>\$ 150,460</b>



### Officers

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**WILD  
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