

1 January – 31 December 2023

2023 Annual Report

for the

Zoo and Wildlife

Nutrition Foundation



PHOTO BY RON MAGILL



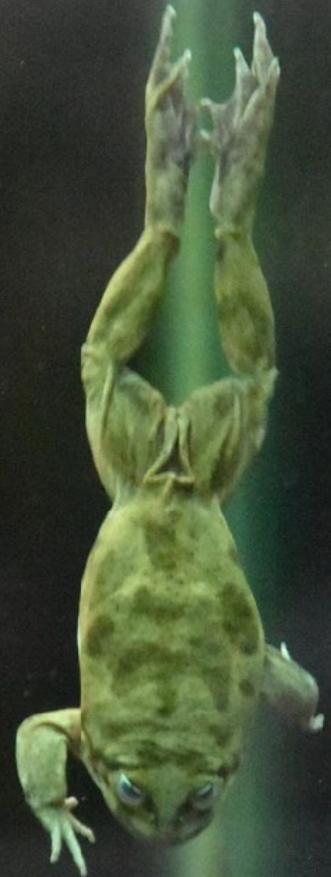
A PUBLICATION OF THE ZOO AND WILDLIFE NUTRITION FOUNDATION

“I didn’t save the world, but I did try to help the world’s animals survive by being a Zoo Nutritionist.”

- Sue Crissey

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Lisa Hubbard

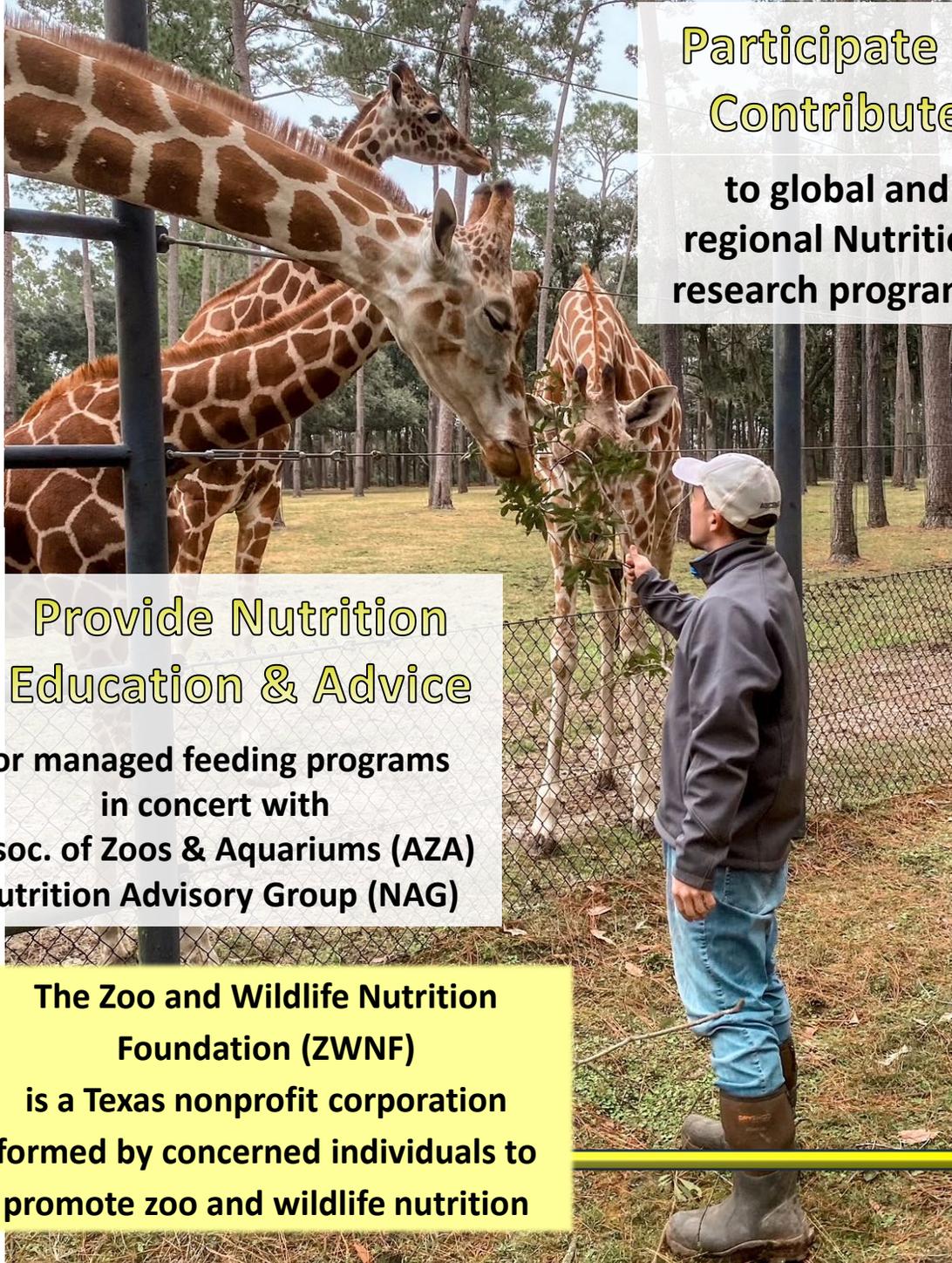
Current information on the Foundation and a link to support the training of the next generation of zoo nutritionists, can be found at:

<https://nagonline.net/zwnf/>

MISSION



**Participate &
Contribute**
**to global and
regional Nutrition
research programs.**



**Provide Nutrition
Education & Advice**

**for managed feeding programs
in concert with
Assoc. of Zoos & Aquariums (AZA)
Nutrition Advisory Group (NAG)**

**The Zoo and Wildlife Nutrition
Foundation (ZWNF)
is a Texas nonprofit corporation
formed by concerned individuals to
promote zoo and wildlife nutrition**

What we do

Promote the advancement of zoo nutrition science through education, research and financial support

- Administer funds for the Sue Crissey Animal Nutrition Residency Fund (SCARF) which trains the next generation of zoo nutritionists
- Raise and manage funds to support the biannual ZWNF/NAG Conference on Zoo and Wildlife Nutrition
- Research Grants for exotic animal nutrition
- Technical, financial, and administrative support for the NAG and its website (<https://nagonline.net>)
- Travel Grants for animal nutrition opportunities

Letter from the President

As 2023 began the Foundation entered its second decade of existence with firm plans to rival the successes of the first 10 years. With a clear plan developed at the strategic planning session of the previous year, we initiated those plans throughout 2023.

With a renewed focus on the SCARF grant to train a 4th zoo nutrition resident, the call for proposals was shared at the end of 2022. A subcommittee of internal and external members was formed to evaluate submissions, interview, and select the next host institution for the Residency. Thereafter, the process for identifying, interviewing, and hiring the next resident took place. Details about the process, the awardees, and progress through the year are found in this year's annual report.

Additionally, in May we sent out a call for applications for our travel and research grants. For the first time we awarded the travel grant to an international student who attended the ZWNF/NAG conference in September. In September we also awarded another \$5,000 research grant to support a worthy project. Travel and research grants updates are in this report, as well.

In September, the ZWNF and AZA Nutrition Advisory Group (NAG) held the fifteenth Conference on Zoo and Wildlife Nutrition in Nashville, TN in conjunction with the American Association of Zoo Veterinarians (AAZV). We began with a workshop on sustainability and resiliency that was followed by great presentations covering many topics over the next few days. The Conference saw perhaps its greatest fund-raising event to date, and many collaborations were developed at the meeting. We have described the highlights of the Conference herein.

As always, we appreciate and encourage your continued interest in the Foundation and its mission. It remains one of our goals to partner with all of the allies of zoo and wildlife nutrition in order to magnify the impacts of our collective efforts. Thank you for your continued partnership and support for the work that the Foundation does to train the next generation of zoo nutritionists!



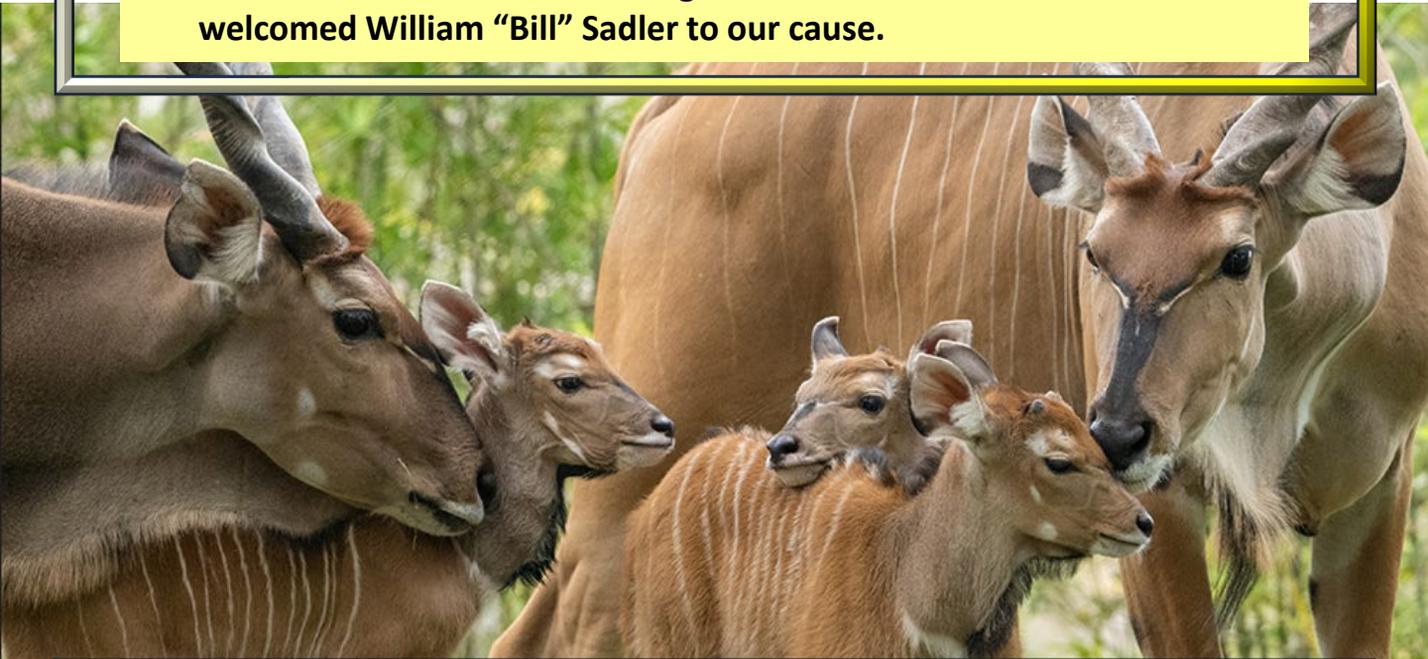
A handwritten signature in black ink that reads "Barbara Henry". The signature is fluid and cursive, with a large loop at the end.

Barbara Henry, MS
President, Board of Directors, Zoo
and Wildlife Nutrition Foundation
Curator of Nutrition, Cincinnati
Zoo & Botanical Garden

Setting the pace for our second decade

We set high goals for ZWNF's second decade and started out bold.

- **We renewed our SCARF commitment with a new resident and residency institution**
- **We supported an engaging, educational conference in collaboration with the AZA Nutrition Advisory Group**
- **We continued our mission to fund nutrition research and support zoo nutrition community members attend, learn and share at our symposia.**
- **Board Member Shannon Livingston rotated off the board while we welcomed William "Bill" Sadler to our cause.**



Our GOALS for 2024

- **Support the first year of training for the newest SCARF resident in Philadelphia.**
- **Continue to increase brand recognition for the Foundation as a trusted and knowledgeable resource helping define the future of the field of zoo and wildlife nutrition**
- **Continue fundraising to support grants for Nutrition research and education**

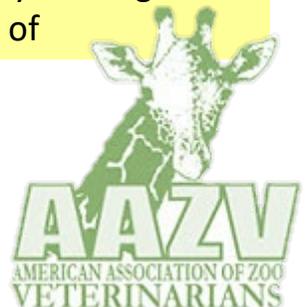
PHOTO BY RON MAGILL

15th ZWNF/NAG Conference on Zoo & Wildlife Nutrition



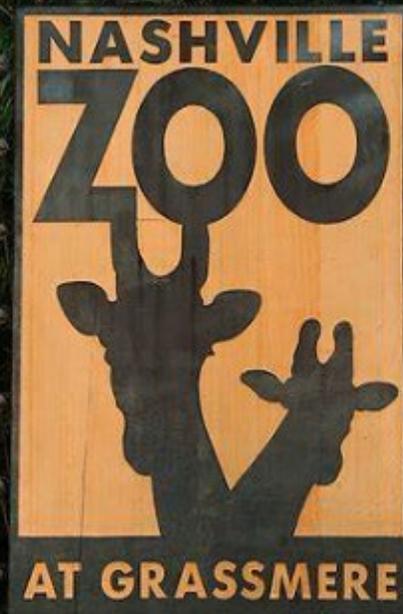
Nashville, TN: September 17-20, 2023

ZWNF continued our partnership with the AZA Nutrition Advisory Group (NAG) and the American Association of Zoo Veterinarians (AAZV) to hold our 15th Conference on Zoo and Wildlife Nutrition. By meeting with AAZV, we hope to bring the topic of zoo and wildlife nutrition to the forefront of the discussion about animal health and engage our veterinary colleagues in nutrition-related content to enhance the nutritional welfare of animals in managed care.



15th ZWNF/NAG Conference on Zoo & Wildlife Nutrition

This year, in consultation with AAZV, we decided to go with a hybrid set-up: both in person and virtual attendance. In theory, this would be the best of both worlds: in person connections while being able to share content in real time with participants around the world. In practice, our virtual attendance was lower than anticipated and technology glitches made connecting with our virtual audience a bit challenging. Still, we were able to connect with additional students.



95 registrants

85 in-person, 14 Virtual (13 students)

The post-conference feedback was positive, citing the strength of our program and opportunities for shared connections. Veterinarians attending received continuing education credits from the American College of Zoological Medicine. The individual papers from the Conference are available on the NAG website:

www.nagonline.net

15th ZWNF/NAG

Conference Highlights

Workshop:

**Resilience for zoo and aquatic nutrition programs
in the face of climate change**

verdis
GROUP



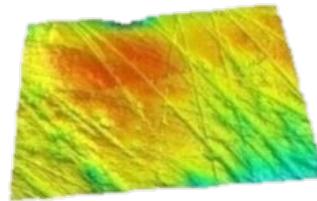
Keynote: Dr. Larisa DeSantis

**Why diets matter and are key to understanding
ancient and modern
ecosystems**



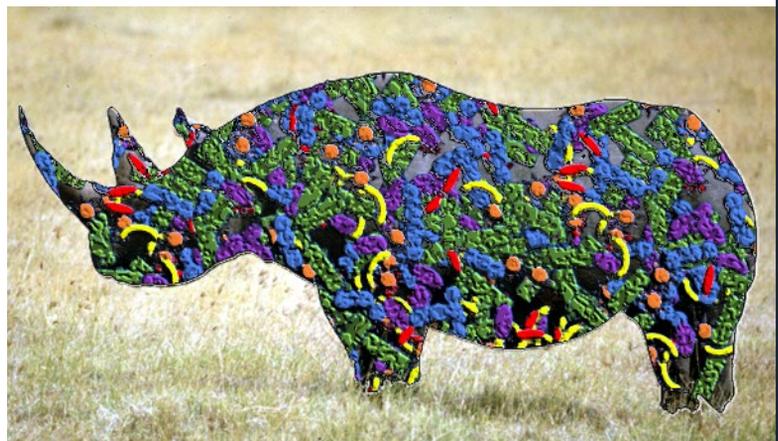
The DeSantis
DREAM Lab

Dietary Reconstructions and
Ecological Assessments of Mammals
Vanderbilt University



Invited: Dr. Sally Bornbusch

**Integrating
microbiome science
and microbial
therapies into
practical animal care
and management**



15th ZWNF/NAG Conference Highlights

Invited: Dr. John Rathmacher

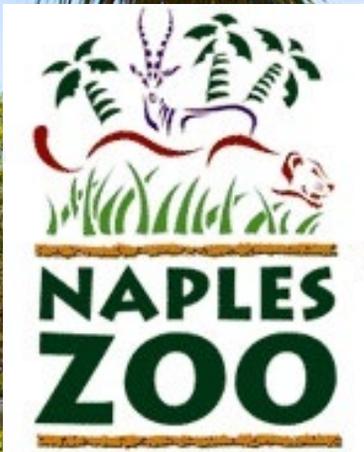


**Vitamin D metabolism and analysis
by liquid chromatography with
tandem mass spectrometry in
multiple species**



Invited: Danielle Green

**Browse and toxic plant programs
for zoological institutions**



Roy McClements

Student/Keeper Competition



1st Place Oral Presentation – Carly Hoffman

“Behavior and fecal microbiome of giraffes engaging in a public enrichment activity”, Texas A&M

1st Place Poster - Christina Burnham

“Establishing blood biochemistry reference values for Nicobar pigeons using the i-STAT Alinity V”, NC State University

2nd Place Poster - Jose Tello

“Training process for the collection of milk samples in central American tapir”, Parque Zoológico Nacional La Aurora, Guatemala City

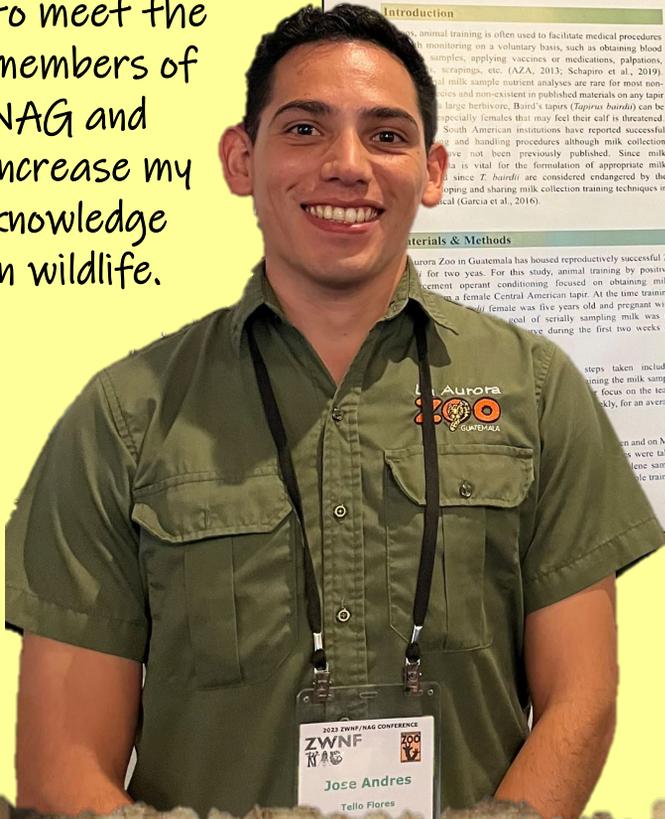
3rd Place Poster - Abby Vallandingham

“Comparative analysis of i-STAT Alinity V Chem8+ cartridge and commercial laboratory blood biochemical analyses in chimpanzees”, NC State University

2023 ZWNF Travel Grant

José Andres Tello

Participating in this conference was a great way to meet the members of NAG and increase my knowledge in wildlife.



TRAINING PROCESS FOR THE COLLECTION OF MILK SAMPLES IN CENTRAL AMERICAN TAPIR (*TAPIRUS BAIRDII*)

José A. Tello, BS¹, Kimberly Ange-van Heugten, PhD², Anneke Moresco, DVM, PhD^{3,4}, Alejandro Striedinger, DVM¹, María Leiva, HS¹

¹Parque Zoológico Nacional La Aurora, Nutrition Department, 5ta calle Interior Finca La Aurora Z 13, Guatemala City, Guatemala, 01013; ²NC State University, Department of Animal Science, Box 7621, Raleigh, NC 27695-7621, USA; ³Colorado Mesa University- Tech, 2805 Blitchmann Ave. Grand Junction, CO 81505, USA; ⁴Reproductive Health Surveillance Program, Morrison, CO 80465, USA.

*jose_a.tello@live.com

Introduction

Animal training is often used to facilitate medical procedures... monitoring on a voluntary basis, such as obtaining blood samples, applying vaccines or medications, palpations, seruminas, etc. (AZA, 2013; Schapiro et al., 2019). Milk sample nutrient analysis are rare for most non-ruminants and non-existent in published materials on any tapir species and large herbivores. Baird's tapirs (*Tapirus bairdii*) can be especially females that may feel their calf is threatened. South American institutions have reported successful training and handling procedures although milk collection have not been previously published. Since milk collection is vital for the formulation of appropriate milk replacer since *T. bairdii* are considered endangered by the IUCN, developing and sharing milk collection training techniques in Central America (García et al., 2016).

Materials & Methods

La Aurora Zoo in Guatemala has housed reproductively successful *T. bairdii* for two years. For this study, animal training by positive reinforcement operant conditioning focused on obtaining milk samples from a female Central American tapir. At the time training the female was five years old and pregnant with her first calf. The goal of serially sampling milk was to obtain samples during the first two weeks of lactation.

Results

The female tapir was successfully habituated to milking by La Aurora Zoo staff and milk samples were collected without complication. In total, two prepartum and 12 postpartum milk samples were obtained through manual massage during the first 15 days after parturition.

Date	Milk Collected (ml)
11/08/2022	0
11/15/2022	0
11/22/2022	0
11/25/2022	40
11/28/2022	25
12/05/2022	15
12/12/2022	10
12/15/2022	5

Figure 1: Amount of tapir milk collected throughout the study.

References

TAG, AZA Tapir Tapir (Tapiridae) care manual. *Association of Zoos and Aquariums*, 2013, vol. 65.

GARCÍA, M., et al. Tapirus bairdii. *The IUCN Red List of Threatened Species* 2016, 2016, p. e.T21471A45173340.

SCHAPIRO, Steven J., et al. Behavioral training as part of the health care program. *Management of animal care and use programs in research, education, and testing*, 2017, p. 771-792.

Images

Image 1 and 3: Milking process.
Image 2: Central American Baird's Tapir calf.
Image 4: QR code to video of milking process.

Conclusions

Animal training by operant conditioning is a valuable tool capable of capturing or modifying behaviors without causing stress in animals, the successful collection of tapir milk samples is a clear example of the importance of training zoo animals.

This training for nutritional research sampling supports the understanding and conservation of the Baird's tapir (as well as similar species). Data from milk samples will provide relevant information for the understanding of the nutrient curve during the first weeks of lactation so that steps to creating infant milk replacers will be enhanced.

Professional keeper staff must be trained to ensure both animal and human safety. Collecting milk samples is a laborious but valuable process with many species lacking reliable published data. This process with many species lacking reliable published data. This study will provide knowledge about tapir biology, enhancing the survival of this species that are of utmost importance.

Acknowledgments

We thank Parque Zoológico Nacional La Aurora for allowing us to carry out this study at their facility. The authors also thank Mary Jena Wagner and Dr. Mike Power for milk collection advice and analytical technique information.

Presenting the work from my institution motivated me to continue with my research projects. I'm very thankful for all the support ZWNF gave me to attend this conference. I look forward to attending the next conference and learning more about wildlife nutrition.

Sincerely,



Preparing for the 2025 ZWNF/NAG Conference

The ZWNF Board and the Steering Committee of the NAG are currently discussing the best path forward for our next Conference in 2025. The Conference is a focal point of our education and outreach efforts, not only for our own members, but also for our colleagues in related disciplines (veterinary, husbandry, research, etc.). Our members recognize the challenges inherent in developing and maintaining these connections. We want to ensure we have the best opportunity to share our messages with the greatest number of zoo and wildlife professionals who are poised to make a significant impact at their home facilities, and the greatest number of eager students who are poised to define the future. There are many pathways to spreading our message. The collective leadership of the ZWNF and NAG are focused on maximizing the value and benefit of our every-two-year meeting.

Stay tuned for additional details about 2025!



ZWNF Research Fund Update



Matschie's Tree Kangaroo Diet, Environment and the Gut Microbiome

Diets consumed by Matschie's tree kangaroo in zoos are lower in fiber and higher in protein and starch than foodstuffs consumed by animals in the wild. Crude protein may have significant impacts on gut microbial composition.

Dr. Diana Koester

Curator of Research
Cleveland Metroparks Zoo

Investigating Nutritional and Microbiome comparison in Chimpanzees

Our chimpanzee nutrition work continues! We have received the necessary permits to import our samples from the Republic of Congo (ROC) into the USA. We are excited about our continued chimpanzee nutrition research.

Dr. Kimberly Ange-van Heugten

Associate Professor of Teaching
NC State University



ZWNF Research Fund

Development of universal Near Infrared Spectroscopy calibrations for moisture, protein and fat in feed derived from animal sources

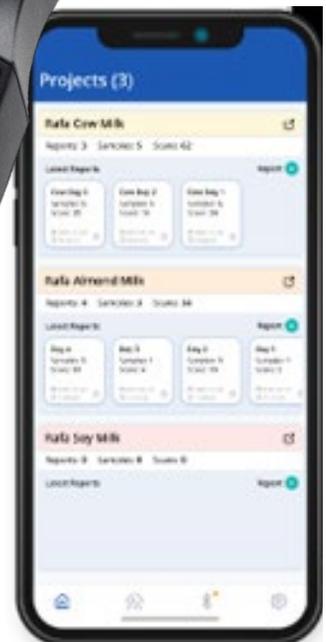
The objective of this study is to develop universal calibrations for predicting moisture, protein and fat in a variety of animal sources fed to zoo-managed species using the least expensive equipment available. The methods and calibrations will be shared with other institutions and will be extremely valuable for quality control and advancement of zoo nutrition.

Dr. Larisa J. Jancewicz

Calgary Zoo

Table 1: Samples to be included in the universal calibration for feed

Item	Additional information
Fish	Smelt, Herring, Salmon, Capelin
Molluscs	Clams, Squid, Krill
Quail	Six-week-old
Chicks	Day-old
Rodents	Mice, rats, juveniles, adults
Rabbits	Juveniles, adults
Invertebrates	Mealworms, superworms, crickets, other
Ground Meat	Equine, beef, poultry
Various Meat cuts	Beef, Equine, Pork, Poultry
Organ Meat	Beef, Equine, Pork, Poultry
Dry Feed	Beef, Poultry, Fish
TOTAL	





Sue Crissey Animal Nutrition Residency Fund

SCARF was established on November 14, 2002, by the Chicago Zoological Society and the NAG. SCARF was established to acknowledge and honor the significant impact that Sue Crissey, Ph.D. had on the field of zoo nutrition during her fifteen (15) years at Brookfield Zoo. Sue died at 51 after an extended battle with ovarian cancer. During Sue's time at the Brookfield Zoo, she expanded the nutrition program from one of diet purchase and preparation to a program of cutting-edge research and problem solving. She led the development of the institutional coalition called the Zoo Nutrition Network. She and her staff were active in publishing many papers and worked to integrate zoo animal nutrition research with nutritional studies of wild-living animals.



One of Sue's greatest commitments was to train, professionally develop, and engage the next generation of zoo nutritionists. To that end, Sue participated in the training of three residents during her time at Brookfield, and those individuals became successful zoo nutritionists at other AZA zoos. It is the hope that SCARF will continue to celebrate Sue's tremendous achievements and contributions to expanding the field of zoo animal nutrition by providing support for residencies in zoo animal nutrition that will improve the welfare of animals in zoos and aquariums.



Residents



2007 Kibby Treiber, PhD
Resident Fort Worth Zoo
Currently Consultant,
Feed the Wild Nutrition, LLC



2011 Adam Reppert, MS, RD, LDN
Resident Fort Worth Zoo
Currently Staff Nutritionist,
Fort Worth Zoo

2020 Siga Lipinkas, MS
Resident Toronto Zoo
Currently Animal Nutrition
Manager, Lincoln Park Zoo.



Welcome Ben Po!

The Sue Crissey Animal Nutrition Residency Fund selected its 4th resident, Ben Po, MS, to continue the mission of educating of the next generation of Zoo Nutritionists. Ben will be stationed in Philadelphia at America's First Zoo and mentored by Barbara Toddes, MS, who has been a leader in the Zoo Nutrition field for decades.

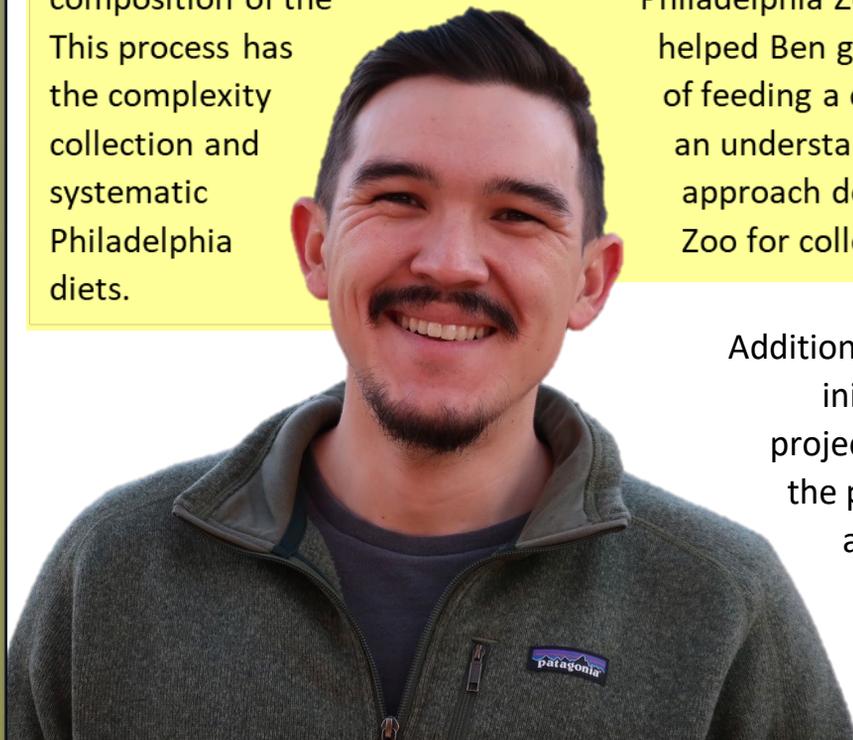


Since starting his residency Ben has focused on transitioning the Philadelphia Zoo feeding program from an Excel-based system into Zoo Diet Navigator (ZDN). Using ZDN, Ben has analyzed the nutrient composition of the

This process has the complexity collection and systematic Philadelphia diets.

Philadelphia Zoo bird diets.

helped Ben gain insight into of feeding a dynamic aviary an understanding of the approach developed at Zoo for collection animal



Additionally, Ben has finished the initial part of a vampire bat project which aims to evaluate the potential use of pig blood as novel food item for the vampire bat colony at the Philadelphia Zoo.



2023



FUNDRAISER

Our 2023 SCARF Fundraiser was a roaring success, raising an all-time high of \$13,838⁹²



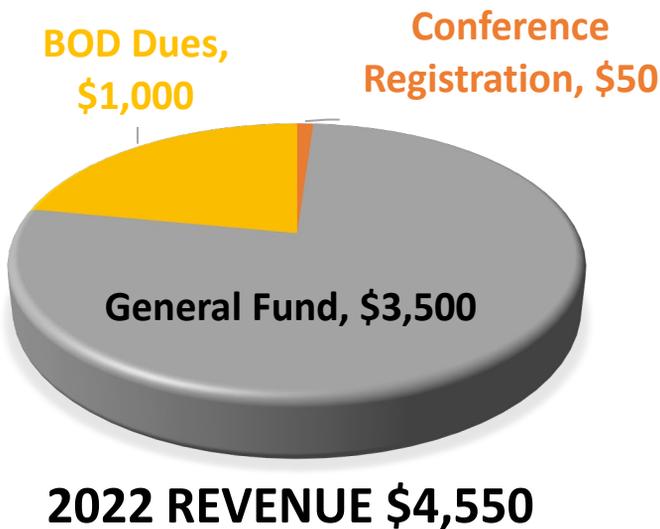
All proceeds go directly to the SCARF Fund

Auction Fabulous Raffle prizes



2022-2023 Financial Statements

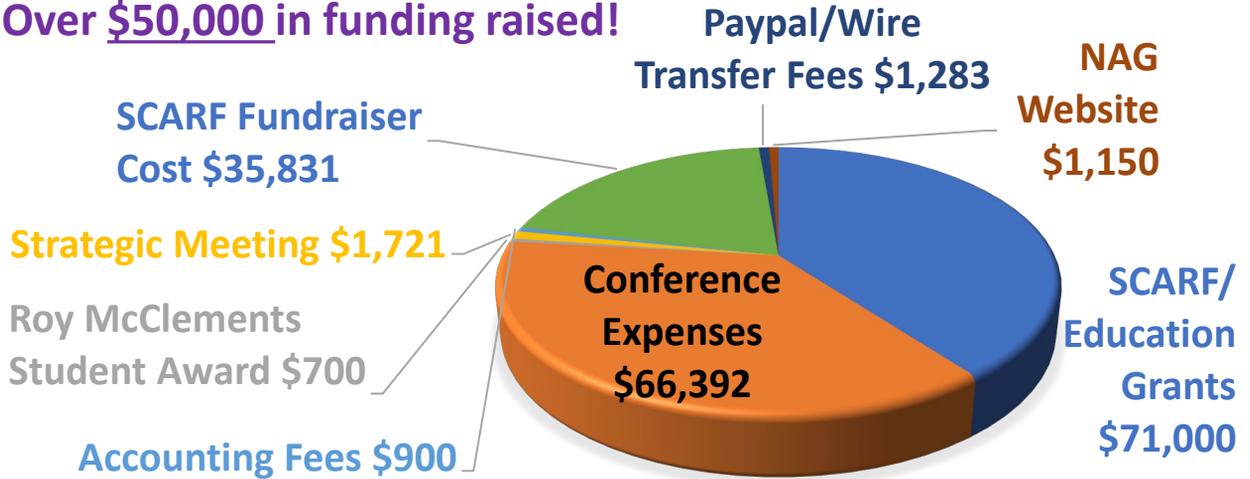
2022 was not a Conference year. The main contributor to revenue was general fund donations. A few conference-related additions (registration) were leftover from the 2021 conference. Revenue remains considerably less for a non-conference year due to a lack of fundraising although annual donations continue to increase.



2022-2023 Financial Statements

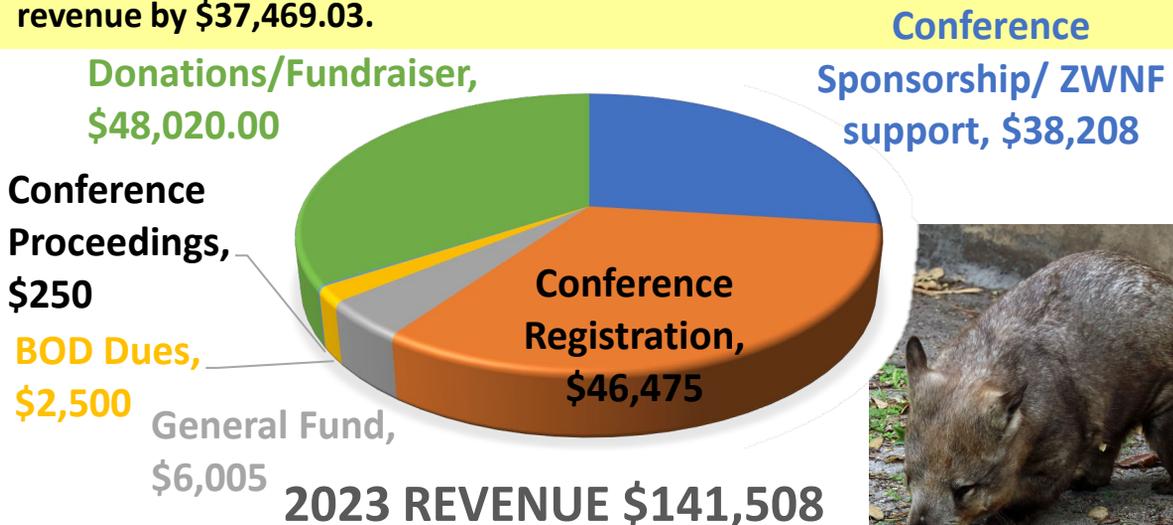
The 2023 conference year exceeded all prior years with a total of \$38,208 at conference time and general fund donations of \$6,005. Another \$14,000 is not reflected in these figures due to posting in the next fiscal year. Additionally, the SCARF fundraiser doubled its previous best year.

Over \$50,000 in funding raised!



2023 EXPENSES \$178,997

2023 was also a big year for education and scholarship expenses including \$1000 for education travel grants, \$700 to students in the Roy McClements Student Keeper Competition and especially the \$70,000 SCARF Grant awarded to the Philadelphia Zoo. Due to these endowments, 2023 expenses exceeded revenue by \$37,469.03.



2023 REVENUE \$141,508



Members of the Board

PRESIDENT: BARBARA HENRY, MS



Barbara has been the curator of nutrition at the Cincinnati Zoo & Botanical Garden for the past 18.5 years and worked 10.5 years at the Brookfield Zoo as the second nutrition resident, and then staff nutritionist. Additionally, she loves to experiment with recipes in the kitchen and plant new perennials in her gardens



VICE PRESIDENT: MIKE MASLANKA, MS

Mike is the Head of the Department of Nutrition Science at the Smithsonian National Zoological Park and Conservation Biology Institute, and the Chair of the AZA Nutrition Advisory Group. He is active in clinical nutrition, lab- and field-based nutrition research, commissary operations, and day to day land resource management at both Zoo facilities.

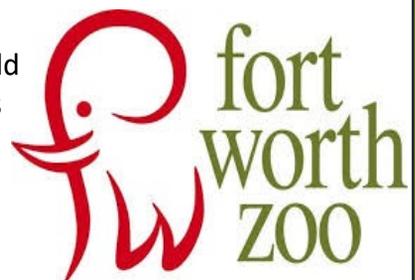


**SMITHSONIAN'S NATIONAL ZOO
& CONSERVATION BIOLOGY INSTITUTE**

TREASURER: ANN WARD, MS



Ann has been the Director of Nutritional Services (formulation, operations, and laboratory) at the Fort Worth Zoo for 30 years. Prior to that she completed the first zoo nutrition residency at the Brookfield Zoo with Sue Crissey, PhD. She was A founding Steering Committee Member of the AZA Nutrition Advisory Group.



Members of the Board

MEMBERS: MARK EDWARDS, PHD

As Professor at California Polytechnic State University, Mark shares a passion for animal nutrition with students drawing upon his experience leading nutrition programs of the Zoological Society of San Diego and Smithsonian National Zoological Park. Mark was introduced to zoo animal nutrition when selected to serve as an undergraduate research intern by Sue Crissey, Ph.D.



LIZ KOUTSOS, PHD

Liz has spent more than 21 years in the comparative nutrition field, working in academia, the feed manufacturing industry, consulting with zoos and aquariums, and now in rearing insects for animal feed applications. Her favorite animal, other than black soldier fly larvae, is the walrus.



KIBBY TREIBER, PHD

Kibby has spent 15 years as a Zoo Nutritionist for Fort Worth Zoo and Zoo Miami. She was trained as a SCARF resident by Ann Ward, M.S. and is currently a free-lance advocate for Zoo Nutrition science with Feed the Wild Nutrition, LLC.



WILLIAM "BILL" C. SADLER

Bill is currently running his own business, Sadler's Natural Solutions. Earlier in his career, he was responsible for building the "Mazuri" brand of diets for zoological and specialty animals. He currently maintains involvement with companies in both developing business and products to service the animal and agronomy areas. He currently manages a small vineyard and has a keen interest in wine.



2023 Donor Recognition



Above \$10000

Mazuri Exotic Animal Nutrition

\$5000-\$9000

Rodent Pro

Central Nebraska Packing

Nestlé

Verdis Group

\$1000-\$3000

Milliken Meat Products

Layne Laboratories Inc.

Fort Worth Zoo

Disney's Animal Kingdom

National DHIA

EnviroFlight

Lab Supply

Australian Outback Plantation

McRoberts Sales Co.

Omega Protein

TRACKS

\$250-\$500

Anderson Feeds

Cincinnati Zoo & Botanical Gardens

The Bug Company

Mr. Justin Elsbury

5J Growers

<\$100

Paypal Giving Fund



ZWNF

Get Involved

The Zoo and Wildlife Nutrition Foundation was created to support the profession of zoo and wildlife nutrition. Nutrition is a key element in the daily wellbeing of every animal under human care. Through the support of ZWNF, the AZA Nutrition Advisory Group and wildlife nutrition community pioneer the path to improved management of animals and ecosystems for sustainability.

We sincerely appreciate all those who have donated to help support us to date. Please consider supporting us in our critical endeavors at:

<https://nagonline.net/27/sue-crissey-animal-nutrition-residency-fund-scarf/>

or <https://nagonline.net/zwnf/>

Donations, whether large or small, go directly to achieving our mission.

PHOTO BY RON MAGILL



A PUBLICATION OF THE ZOO AND WILDLIFE NUTRITION FOUNDATION