

Institute for Conservation Medicine Newsletter

Summer 2023



Research Projects

Institute of Museum and Library Services Grant

In 2022, we were awarded a three-year Institute of Museum and Library Services Grant for a “One Health Education Now for Empowering Tomorrow’s Leaders” initiative. The objective of the grant is to have paid high school interns and their teachers work together to develop a One Health curriculum used to educate schoolmates, with the ICM team as mentors. The students select a local One Health issue; teach others about the environmental, animal and human health impacts associated with that issue; and explain how the issue affects their lives and their community. Interns also learn about soil, water and air sampling as it pertains to healthy environments and collect samples near their school, their neighborhoods and in a local nature area. In 2023, we worked with four students from Innovation High School in the Ferguson-Florissant district and six students from Hazelwood West High School.



Jaylen Gregory, Mia Williams, Toni Smith, and Wes Ming instructing Innovation students how to collect soil and water samples

The Innovation High School interns selected environmental racism as their focus area and researched asthma and air pollution, lead in water, and food deserts. They developed a three-week One Health curriculum, which they taught to fellow

high school students in April, including a hugely successful field trip to the Audubon Riverlands to collect water and soil samples.

The Hazelwood West High School interns also selected environmental racism as their local issue,

with a focus on the radiological contamination associated with Coldwater Creek in north St. Louis County. These interns also developed a One Health curriculum; however, instead of teaching it to classmates, they presented the information at the district-wide STEM Fair in March. Students answered questions about One Health from engaged public attendees at the fair.

The grant also includes 80-hour paid summer internships, and Jaylen Gregory and Toni Smith (Innovation) accepted positions. They will spend the summer learning various field skills associated with the St. Louis Box Turtle project and participating in turtle tracking events as part of our summer outreach work. (See photo under Outreach.)

Microbiome Study for Box Turtles and Giant Tortoises

Kathleen Apakupakul has been working with Dr. Fangqiong Ling of Washington University in St. Louis and her lab on processing the mouth, foot and cloaca swab samples from our Forest Park and Tyson Research Center box turtles, collected last summer, for a microbiome study. Microbiomes have been connected to animal health, and these data will provide insight into the microbiome composition of the three-toed box turtles as well any potential differences in the two populations. Fecal samples from 40 Galapagos tortoises also were analyzed for microbiome composition. These data will be useful to view alongside the antibiotic gene resistance data from Dr. Ainoa Nieto Claudin’s Ph.D. work, and will provide insights into the impact of antibiotics on microbiomes and, by extension, tortoise health.



Josef Westberg, Lucas Gehner, Ava Nelson, and Alexis Watt talking with the public about One Health at the Hazelwood STEM Fair



Ainoa will collect more giant tortoise samples this year to assess potential differences in the microbial communities between migratory and non-migratory females.

Ranavirus in Box Turtles

A total of five three-toed box turtles have tested positive for FV3 (frog virus 3, a type of ranavirus) over the last two years. These turtles have come from the greater St. Louis region, and most displayed severe clinical signs before dying or being euthanized. Prior to these cases, ranavirus had not been detected in Missouri, and the incidence appears to be increasing. The emergence of FV3 in local box turtles is being documented by the ICM team, along with Saint Louis Zoo Pathologist Dr. Mary Duncan and colleagues at the Wildlife Rescue Center.

Box Turtle Genetics

The final report from our collaborators at Tangled Bank Conservation revealed the genetic analysis results of the box turtle populations at our two study sites, Forest Park and Tyson Research Center. While the Forest Park turtles are likely a combination of abandoned pets and local residents, this mixture had minimal impact on the population structure and genetic diversity of the Forest Park turtles. In addition, both the Forest Park and Tyson Research Center box turtles have less genetic diversity than expected. We are now considering how the genetic data can be of value in conservation efforts for the Missouri State Reptile – the beloved three-toed box turtle.

Galapagos Tortoise Movement and Ecology Programme (GTMEP)

As usual, things are very busy in the Galapagos! The new Principal Investigator, Patrick Moldowan, arrived just in time for the annual health assessments of the 20 tagged female tortoises in May. Drs. Steve Blake and Sharon Deem headed down in late June to work on Santa Cruz Island (Galapagos) for tortoise X-ray checks of nesting females, and for a trip to Alcedo Volcano with a BBC film crew to check on our study tortoises on the volcano.

Last July, Karina Ramón, a biology student from Galapagos Island and a GTMEP volunteer since 2017, defended her thesis entitled “Plastic ingestion in giant tortoises: An example of



Ainoa Nieto Claudin and Patrick Moldowan tracking giant tortoises

a novel anthropogenic impact for Galapagos wildlife.” Karina’s research has proven for the first time that Galapagos tortoises living on the most human-populated island are consuming plastics and other remnants of our modern existence. The scientific data behind this study are invaluable and are being presented to local authorities so management decisions can be made to reduce this human-caused

health threat to the iconic giant tortoises. The related scientific publication should be out in 2024.

Forest Park Living Lab (FPLL)

The 2023 field season for the FPLL kicked off in February when we placed GPS transmitters on two mallard ducks and collected samples for health assessments. Planning for many other species continued into spring, and we expect the second half of 2023 to be very busy! This spring, Dr. Stella Uiterwaal (the Biodiversity Postdoctoral Fellow managing the FPLL project), Jamie Palmer and the ICM spring interns set up 11 camera traps in Forest Park, and the summer will be spent understanding fox and coyote locations and behavior. From resilient box turtles and snapping turtles, to majestic great horned owls and waterfowl, to intelligent coyotes and foxes, the team is ready to evaluate many of the animals that call Forest Park home. (See Outreach below for the Forest Park Living Lab night out at the Sheldon!)

Cuban Crocodiles

Jamie, Ainoa and Kelvin Alvarez, our partner at the Wildlife Conservation Society (WCS)-Bronx Zoo, traveled to Matanzas, Cuba, in April 2023 to meet with our Cuban partners at the Zapata Crocodile Farm. Our goal was to identify the health-related issues in the Cuban crocodiles currently at the farm and in the free-living populations and how best to address them. We discussed the



Galapagos giant tortoise



Ainoa Nieto Claudin, Jamie Palmer, Kelvin Alvarez in Cuba



next steps in our partnership with the Farm, WCS-Bronx Zoo and other partners. Also, for the first time, we were able to meet with the Flora/Fauna Government Office to discuss our research, which is a significant (and necessary) step to move the work forward. Outside of meetings, we were finally able to take a trip to the Zapata Swamp to see free-living Cuban crocodiles in their natural habitat. In addition, we were thrilled to assist in the GPS tagging of two adult female Cuban crocodiles born and raised at the farm and which were released into the Zapata swamp.



Adult Cuban Crocodile with GPS tag being released into the wild

Canid (Carnivore!) Conservation Initiative

Over the winter (January/February), we collared three coyotes using our new safe snares. The first coyote (Angie) had a severe case of mange, which we treated; however, the other two (Kim and Ruth Ann) were both healthy females. Angie seems to have established a home range across the Meramec River from Tyson Research Center, and we've set up cameras along the Rock Hollow Trail south of Wildwood to hopefully capture photos

to determine if her skin has improved after our treatment. Kim seems to have a territory just west of Tyson Research Center, mostly in West Tyson County Park.

We also collared two more female bobcats over the winter, Beth and Solynx. Both were subadults when captured, and we suspect they are likely sisters from a litter of four we caught on camera last summer at Tyson Research Center. So far, they both seem to be sticking close to the Tyson property. It will be interesting to see if they act like human teenagers and move around a lot more than the adult bobcats this summer! We're hoping we'll see indications that one or both has picked a den site and might have kittens this year.



Coyote (Kim) captured at Tyson Research Center, February 2023

Lastly, although we're sad to report that Dr. Fernando Najera left the project at the end of February, we're thrilled for him that he landed his dream job as the head veterinarian for the UC-Davis California carnivore project. We like to think his time with the Saint Louis Zoo was the deciding factor in his offer!



ICM team collecting coyote health samples at Tyson Research Center

Outreach

The Forest Park Living Lab was featured in both the Ladue News (February) and St. Louis Magazine (May). Both were great highlights of our work, although we had to correct the statement that owl pellets are feces for the online St. Louis Magazine. (Everyone needs to know owl pellets are undigested food that is expelled from the mouth ... so much more interesting than feces!) The HEC-TV piece on the Forest Park Living Lab was featured on the Spotlight! program on KPLR (PBS) in April and also has been added to the [HEC website](#).

The Forest Park Living Lab also co-hosted a celebration of nature through music, hosted at the Sheldon Theater. A video of various field activities and species played during a violin concert by Erin Schreiber with the St. Louis Symphony Orchestra. Photos and posters of our work were in the lobby. Co-investigator Jeff Meschach, our partner with the World Bird Sanctuary, brought a great horned owl for people to meet.

Stopping the Next Pandemic, a 90-minute documentary, is an excellent story about zoonotic diseases, loss of biodiversity and One Health. This film was partially filmed at the Zoo last September and includes quotes from Sharon and great footage of the Zoo's animals. A sneak peek is on [YouTube](#). Our (unbiased!) opinion that it was excellent was verified when the film won Best Environmental Film for January 2023 by the Cannes World Film Festival. Stay tuned for a Conservation Conversation in early



October, which will feature this film and a panel discussion that includes Sharon and her colleagues.

The BBC and the Discovery show “Jurassic World”, which was partially filmed at the Saint Louis Zoo’s giant tortoise outdoor habitat in 2022, has aired in the UK and is coming to the US soon. Sharon and Stephen Blake were filmed with the tortoises and talked about their work in the Galapagos. The show is about extinct dinosaurs, Sauropods and living giants (like Galapagos tortoises). Our research from 12 years with the Galapagos Tortoise Movement and Ecology Programme will be in this documentary comparing extinct and extant animals.



Lee Hamilton Elementary School students measuring a box turtle

In April, we were finally able to restart our Field Conservation (FC) Grant “St. Louis Box Turtle Project Little Creek Extension.” Working with Lee Hamilton Elementary School in the Ferguson-Florissant School District, we used experiences at the Little Creek Nature Area to build upon the third grade curriculum. We supply a classroom program that highlights the part turtles play

in food chains, forest ecology and turtle conservation. We also get the students into nature tracking box turtles and collecting observational data. So far this year, 93 elementary students have tracked box turtles at Little Creek!

Chris Hwande, Science Coordinator for Ralph M. Captain Elementary School in the School District of Clayton, runs a five-week after-school box turtle club. The students create target questions to answer about turtles and track the box turtles in Forest Park using telemetry methods. On World Turtle Day, club members turned into nature ambassadors, enthusiastically talking to Zoo guests about their beloved box turtles.



Captain Elementary box turtle club students talking with Zoo visitors during World Turtle Day

members turned into nature ambassadors, enthusiastically talking to Zoo guests about their beloved box turtles.

Keri Lammering took a group of students on a Gateway to the Great Outdoors turtle safari trip in Forest Park to meet our box turtles. Keri reported that meeting their first turtle “in person” was transformational for the students.



One Health Fair volunteers, interns, and ICM team

The Zoo hosted its ninth annual One Health Fair on April 22, happily coinciding with Earth Day. There were seven “stations” around the Zoo where people could learn about the importance of biodiversity and amazing facts about both forest and ocean health. Fair participants also learned about the role tiny pollinators play in balancing ecosystems, as well as the negative impacts of climate change and invasive species.

Are you wondering what life is like for our summer interns? Nate Phillips, our intern during summer 2022, gave a wonderful presentation at Cornell College about his ICM internship. You can watch his presentation [here](#) to truly get a feel for all the work (and fun!) our summer interns have with us.

Sharon and Dr. Laura Budd taught the course “One Health: Linking the Health of Humans, Animals, and the Environment” to 29 Washington University in St. Louis undergraduates this spring. This is the fifth year Sharon has led this course, and students continue to be interested and engaged in One Health concepts.

Sharon gave three lectures at the VMX Veterinary conference: “Spillover and Spillback: Lessons from a Multi-year Pandemic”; “A One Health Approach for Understanding and Mitigating Emerging Infectious Diseases”; and “Emerging Noninfectious Diseases of Wildlife.” Sharon also became chair of the Wildlife Health section for this international veterinary conference for the next two years.

Sharon was an invited panelist in the session “Addressing the Triple Crisis: Climate Change, Biodiversity Losses and Pollution” in the Consortium of Universities for Global Health in April. Co-panelists were from the United Nations Environmental Program, World Bank, EcoHealth Alliance and Georgetown University.



Sharon co-authored a guest commentary with Dan Ashe Dan Ashe (President of the Association of Zoos and Aquariums) and John Scanlon (a strategic advisor on sustainable development). The commentary is online [here](#), and it generated a lot of good discussion on social media.



Jaylen Gregory and Toni Smith with Forest Park box turtle

Dr. Lilian Catenacci led a Disease Risk Analysis workshop for Hansen's disease, also known as leprosy, in Piauí State of Brazil. The public health agency was very happy with the workshop and 19 separate government and academic institutions were involved.

Dr. Ainoa Nieto Claudin wrote a wonderful blog titled "From Galapagos to Madagascar: A Journey to Save Tortoises." You can read it [here](#) and see many terrific tortoise photos.

Jamie gave a presentation to approximately 200 SSM Health staff members in April at the Zoo's McDonnell Center at River Camp. SSM Health specifically requested this event on One Health with an emphasis on our local and global chelonian research, and we were excited to share our work with a new audience. Jamie spoke about the Zoo's numerous One Health projects, our local box turtles, the Galapagos and Madagascar tortoises, and our two studies on the human health benefits of zoos.

Donor Thank Yous

Donor Spotlights:

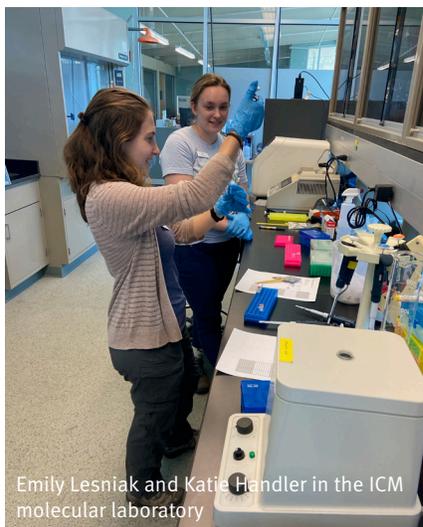
Deepening her support of the ICM beyond financial gifts, Margaret "Peg" Cooper, Ph.D. visited in March for a tour and to explore volunteer opportunities. She is currently a Zoo docent, and now retired from Saint Louis University as an anatomy professor. We enjoyed sharing about our research programs and engaging her expertise in the details of molecular science. At the end of the day, Peg stated that "this was the best day of my life!" She began volunteering in July.

We were honored to learn Carol Gronau's love of ICM continues as her estate made a significant follow-up contribution to the Carol Gronau Legacy Endowed ICM Fund. We are so appreciative of what Carol has contributed to help ensure ICM continues to protect wildlife health and put conservation science into action.

We want to thank our very generous donors during 2022:

- Margaret (Peg) Cooper
- Diana & John Deem
- Virginia Herrmann
- Steve King
- Jane Feigenbaum Morris
- Angie and Ken Nettleton
- St. Augustine Alligator Farm Zoological Park

People



Emily Lesniak and Katie Handler in the ICM molecular laboratory

We had three wonderful spring interns. Emily Lesniak and Katie Handler were instrumental in making the One Health Fair a success, and Brianna Hawkins, who started during summer 2022, is the creative force behind the incredible St. Louis Box Turtle Project social media posts. If you have not done so recently, check out the Instagram / Facebook pages – you will be amazed.

For the first time this summer, thanks to the ongoing generosity of our ICM donors, we're able to pay two new interns (Addison Brannon and Riley Demo) a small stipend, and we're thrilled to do the same for Bri who continues to promote our work in informative and fun ways. Interns power our summer fieldwork, and we could not get to all our box turtles, conduct turtle safaris with various school groups, continue the canid research, and find the targeted Forest Park Living Lab species without them.

We are also excited to have Dr. Kelly Souza da Silva join ICM for the summer under a Field Conservation Grant. Kelly is a veterinarian who studies zoonotic pathogens with Dr. Lilian Catenacci in Brazil. During her time with us she will receive advanced training in One Health/conservation medicine and also learn about One Health education and outreach techniques.

ICM Newsletter

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Lilian received a high honor in March when she was given the title of citizen from Piauí, which is similar to being given a “Key to the City” in the US. Lilian was nominated by the President of the Legislative Assembly of the State of Piauí in honor of her incredible work in One Health, which the Saint Louis Zoo supports in many ways.

Grants

Following last fall’s Institute of Museum and Library Services Grant, we continued to reap rewards for our grant writing efforts and were awarded three grants this year so far!

American Association of Zoo Veterinarians Wild Animal Health Fund Grant “Anticoagulant Rodenticide Exposure and Associated Risk Factors in Missouri Mammalian Carnivores and Sympatric Omnivores.” \$10,000. Laura, Jamie, Fernando and Sharon will all be involved with this work during 2023-2024.

Field Research Conservation Grant “Seasonal dynamics of the gut microbiome of *Chelonoidis donfaustoi* and correlation with health of migratory and non-migratory individuals.” \$10,000. This grant focuses on the giant tortoises and ICM is collaborating with Dr. Fangqiong at Washington University in St. Louis.

Taylor Geospatial Institute Grant “Forest Park Living Lab Geospace: Partnering with TGI to explore biodiversity and human dimensions of Forest Park.” \$75,000. This grant is a collaboration between the Saint Louis Zoo, Washington University in St. Louis, Saint Louis University, National Great Rivers Research and Education Center, Forest Park Forever and World Bird Sanctuary.

Publications

We continue to publish scientific articles about our research.

Deem, Sharon L., Rivera, S., Nieto-Claudin, A., Emmel, E., Cabrera, F., Blake, S. “Temperature along an elevation gradient determines Galapagos tortoise sex ratios.” *Ecology and Evolution*. 2023.

Palmer, J.L., Nieto-Claudín, A., Sosa Rodriguez, G., Perez Fleitas, E., Augustine, L., Deem, S.L. “Hematology and blood chemistry values in Cuban Crocodiles (*Crocodylus rhombifer*) housed at the Zapata Swamp Crocodile Farm, Cuba.” *Journal of Zoo and Wildlife Medicine*. 2023.

Blake, S., Palmer, J., Brenn-White, M., and Deem, S.L. “Roads and fragmentation threaten both wide-ranging rural, and sedentary urban, box turtles in Missouri.” *Urban Ecosystems*.

Najera, F., Uiterwaal, S.; Crespo, E.; Grande-Gomez, R.; Sanchez, J.F.; Mata-Huete, M.; Palmer, J.; Iturrarte, G.; Peña, J.; Munkhtsog, B.; Poyarkov, A.; Hernandez-Blanco, J.; Aleksandrov, D.; Munkhtsog, B.; Galsandorj, N.; Deem, S. “Insights into the spatial ecology of severely injured free-ranging felids: Iberian lynx, bobcat, and snow leopard.” *Journal of Wildlife Management* 2023.

We hope you enjoyed our summer newsletter. It’s friends like you that allow us to conduct the research and outreach described in these pages. If you would like to continue to support our various projects, please go to the Saint Louis Zoo website, select GIVE in the upper right, then select General Gifts near the bottom. On the online form under Ways to Give, there is a dropdown where you can select the Institute for Conservation Medicine. If that sounds like too many steps, we are happy to accept old fashioned paper checks sent directly to Dr. Deem at the Zoo!

As everyone knows, conservation is about people. This is especially true for One Health. If interested in funding people power, our wish list includes paid internships, post-doctoral fellows, and even a full time wildlife veterinarian which would move our research to the next level. We’d also love to receive funding to take our mobile molecular lab on the road to assist Dr. Lilian Catenacci with her One Health research in Brazil.

To learn more about how you can contribute to the work of the ICM, contact Director Dr. Sharon Deem at (314) 646-4708 or deem@stlzoo.org.

We can’t thank you enough for supporting animal, human and environmental health of our planet!

For more information on the Institute for Conservation Medicine, visit stlzoo.org and find us under Our Work.

Our Mission:

To conserve animals and their habitats through animal management, research, recreation, and educational programs that encourage the support and enrich the experience of the public.



Saint Louis Zoo

Institute for Conservation Medicine

Healthy Animals. Healthy People.