

Institute for Conservation Medicine Newsletter

Winter 2024



Welcome

Director, Dr. Sharon L. Deem

Where did 2024 go? As we finish out the 13th year of ICM work for healthy animals and healthy people, I am thrilled to once again share updates from our global conservation science, actions, and outreach. Each time we send out this newsletter, we get to reflect on how far we've come, how grateful we are for

our partners, and that we get to do what we do every day—working together for wildlife conservation. We had many successes in 2024, and we share some of the highlights in this update. The Forest Park Living Lab (FPLL) continues to generate interest, as does the work we do with confiscated tortoises in Madagascar and crocodiles in Cuba. Please enjoy this installment of the ICM Newsletter, and thank you for believing in the Zoo's work in One Health.



Sharon with a juvenile ploughshare tortoise for a veterinary exam.

Research Projects

The Saint Louis Zoo WildCare Institute (WCI) celebrated its 20th anniversary in November. The ICM began partnering with the Institute in 2019, when the Center for Chelonian Conservation (WCI CCC) was launched. Led by Sharon Deem, this WildCare Center supports turtle and tortoise health and conservation efforts locally and globally, including:

- St. Louis Box Turtle Project (SLBTP) – started by the ICM in 2012
- Galapagos Tortoise Movement Ecology Programme (GTMEP) – ICM became a collaborating partner in 2013
- Madagascar Confiscated Tortoise Health Program – ICM began working in tortoise conservation in Madagascar in 2020

This year we released the latest WCI CCC Impact Report. This gave us the chance to reflect on what we have accomplished for turtles over the last 5 years. These are some of the lessons we have learned:

- Illegal trade and trafficking is having a dramatically negative global impact on turtles and tortoises.

- Research is at the core of all of our work. We remain dedicated to the science that drives conservation.
- Outreach & communication are essential for making lasting changes. We need to communicate our findings in ways that are relevant to people's lives.
- Turtles are amazing ambassadors to connect people to the conservation of species in both their backyard and around the world. These charismatic creatures are perfect for getting people of all ages engaged in conservation efforts.
- Funding is a critical resource for successful conservation programs. Without the combination of funds from the Zoo, external organizations, grants, and generous donors, our work would not be possible.

Madagascar Tortoises

Four representatives from the Saint Louis Zoo were in Madagascar for most of November. ICM staff Jamie Palmer, Ainoa Nieto Claudin, and Sharon Deem were joined by zoo clinical veterinary technician, Jane Merkel.

This trip was the culmination of months of planning with partners at the Turtle Survival Alliance (TSA). Travel to Madagascar was part of ICM's commitment to providing health care to the thousands of confiscated tortoises under human care before release back to their native habitats. We worked at three tortoise holding centers and trained Malagasy veterinary students. We completed health assessments on hundreds of animals, including radiated, ploughshare, and spider tortoises, some slated for reintroduction back to the wild.



Jamie taking a blood sample from a juvenile ploughshare tortoise.



Ainoa with confiscated juvenile radiated tortoises during veterinary check-ups.

To learn more about the plight of the radiated tortoise, check out this September 2024 article published on the Saint Louis Zoo's blog (<https://stlzoo.org/news/zoo-views-the-plight-of-a-tortoise-why-care>), co-authored by Sharon L. Deem, Bonnie L. Raphael, and Jamie L. Palmer.



Animal Spotlight

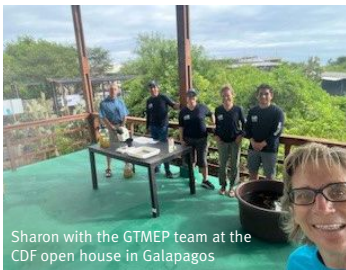
The Ploughshare Tortoise, with its high-domed, golden shell and tranquil demeanor, is one of the rarest tortoise species in the world. Scientifically known as *Astrochelys yniphora*, this species is endemic to Madagascar and faces an uphill battle for survival. With its wild population dwindling to less than 500, the Ploughshare Tortoise exemplifies the dire circumstances many of the planet's unique creatures face due to poaching and habitat loss. Black market prices range from a few thousand dollars for juveniles to tens of thousands for adults.



An adult ploughshare tortoise.

Saving the Ploughshare Tortoise takes the collective effort of conservationists, governments, local communities, and international organizations. The immediate goals are to stop poaching, reclaim animals from illegal collections, and place them in accredited captive breeding programs.

(excerpts from Zoo Guide, March 2024, <https://zoo-guide.com/ploughshare-tortoise-earths-rare-gem/>)



Sharon with the GTMEP team at the CDF open house in Galapagos

Galapagos Tortoise Movement and Ecology Programme (GTMEP)

Earlier this year, Sharon worked with the Charles Darwin Foundation and GTMEP to select Patrick Moldowan's successor as the new GTMEP principal investigator. This summer, Sharon and Steve Blake traveled

to Galapagos to meet with collaborators and welcome the newly hired PI, Courtney Pike. Sharon also gave Jennifer Eckert and her husband a behind-the-scenes of the GTMEP at CDF. Jennifer is a high school teacher in Indiana who first came to the Zoo 18-months ago to learn about the GTMEP. She then was awarded an education grant to travel to Galapagos to visit the islands.

Sharon spent the first week of July in the field with Christian and technicians Freddy radiographing 11 female giant tortoises in the nesting zone: 5 without eggs and 6 with eggs. She also went to the Cedrela forest with Freddy, Christian, Steve, and Courtney. Lastly, the team participated in the annual CDF open house to talk about tortoises with hundreds of school kids and tourists.

After nearly three years of production, we were excited to learn that the documentary Journey Back to Alcedo has been completed. This film highlights the vital role of women in science and Galapagos conservation. Our very own Dr. Ainoa Nieto Claudin is one of the stars of this production. Journey Back to

Alcedo is now being submitted to film festivals worldwide. We look forward to seeing the finished film and sharing where it is available for public viewing in the near future. To view a teaser, visit the film's kickstarter page: <https://www.kickstarter.com/projects/765352878/journey-back-to-alcedo>

St. Louis Box Turtle Project (STLBTP)

Since 2012, we have been collecting movement and home range data from tagged box turtles at both field sites. All of our box turtle movement data are now live on MoveBank. This is an open access portal for movement data from species across the globe. https://www.movebank.org/cms/webapp?gwt_fragment=page=studies,path=study10135184

Jamie spent time at Southern Illinois University, Edwardsville, talking with Dr. Essner's seminar class about the ICM's chelonian work. She advised graduate students on methodologies and field projects. There is a small population of ornate box turtles near the SIUE campus. These students hope to track and study the movement and ecology of this small group.



Forest Park Living Lab (FPLL)

The FPLL team has been hard at work monitoring, trapping, tagging, collaring, and evaluating the health of wildlife in Forest Park. In 2024, we successfully tagged/collared 23 animals. Their movement data is available on MoveBank as well. Many of the individuals we track remain in the St. Louis area. However, Hermann, a red-tailed hawk we named after ICM supporter Ginny Hermann, had much bigger travel plans. After being collared in Forest Park, he flew cross-country to spend a few months in and around Canada. Hermann has recently returned to the St. Louis area and seems to like spending time out at Lambert airport.

<https://www.forestparklivinglab.org/>
https://www.movebank.org/cms/webapp?gwt_fragment=page%3Dstudies%2Cpath%3Dstudy1605024900

In the Summer 2024 Newsletter, we introduced a new species to our study and began following the movements of two urban coyotes. When we first met them, Silver was a young male with mange and Solar was a pregnant female. In the following months, they logged hundreds of miles, crisscrossing St. Louis, and Solar gave birth to a litter of 5 pups. The local interest and news articles surrounding these coyotes offered an opportunity to educate our neighbors on the importance of predators in an urban landscape. Unfortunately, the journeys of both these coyotes have come to an end.

https://www.stltoday.com/news/science/coyotes-silver-and-solar-logged-hundreds-of-miles-crisscrossing-st-louis/article_62c54af4-a5de-11ef-bc17-b3181584952c.html



On Oct 28th, the St. Louis Post-Dispatch newspaper and stltoday.com published a follow-up, “Researchers hoped to track two coyotes in St. Louis for a year. The animals didn’t make it.” It described the fates of both coyotes that the Forest Park Living Lab began monitoring earlier this year. One succumbed to heart-worm disease and the other died from blunt force trauma. The ICM is saddened by the loss of these animals and hopes that this article helps inform the public on the challenges of wildlife in urban areas. Sharon told the reporter, “Every time we have a mortality, it hits us. We want to learn about these animals to help conserve biodiversity. As we become more urbanized, we know this human-wildlife interface is real and alive.”

https://www.stltoday.com/news/local/metro/researchers-hoped-to-track-two-coyotes-in-st-louis-for-a-year-the-animals-didn/article_7a2f74e4-92f6-11ef-8808-6fa796a6fe25.html

Cuban Crocodiles

Etiam Perez Fleitas, lead biologist at the Zapata Crocodile Farm, Cuba visited the Zoo Oct 29th – 31st. Etiam is our partner on the WCI program for Crocodile Conservation in Cuba. This was Etiam’s first time in St Louis. The reason for this trip was to bring our biological samples that we collected in 2018-2019, which we have been working to import for some years now. Now that our samples are in the US, we can perform diagnostic testing for pathogens of conservation concern for the Cuban crocodile. This is a huge success for this program as sample export from Cuba has been incredibly difficult.

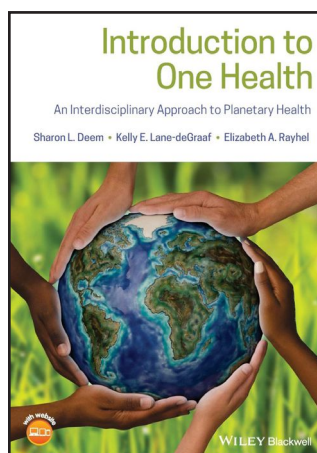
Ecuador

In late June, Sharon and Jamie joined Jose Luis Rivera (National Polytechnic University in Quito) and Kelvin Alvarez (WCS-Bronx Zoo Dept of Herpetology) for a day at the Quito Zoo in Ecuador to collect samples from two American crocodiles in the zoo’s collection. All animals at this zoo are rescued from either wildlife trade or injury and are not releasable. Sharon discussed a few other cases with the zoo veterinarians. It was a great day of networking. The Quito Zoo is doing wonderful things to improve animal welfare for the species in their collection. After leaving Quito, Sharon headed off to Galapagos and Jamie traveled to southern Ecuador/ northern Peru along the Pyongo and Tumbes rivers, which divide the two countries. She was with an Ecuadorian team led by Jose Luis Rivera to collect blood and swab samples from wild crocodiles.

These samples are part of a pilot data set for an upcoming grant proposal to determine environmental contaminants in the rivers that are a result of unregulated gold mining in the region.



Jamie collecting blood from a crocodile in Ecuador.



Institute of Museum and Library Services (IMLS) One Health Education Grant

Year three of the Institute of Museum and Library Services (IMLS) “One Health Education Now for Empowering Tomorrow’s Leaders” grant has officially kicked off! In the spirit of spreading the One Health message to the next generation, the Institute for Conservation Medicine has partnered with three schools rather than two this year. Each of the three schools, Jennings Senior High School, Pattonville High School, and the Parkway School District, had multiple applicants for the internship opportunity. Ultimately, two from each school were offered roles through a thorough selection process that included feedback from their teachers and Zoo mentor, Grace Warshaw. These students will not only learn more about One Health but will also work closely with their mentors to make the most of this opportunity to educate and influence their classmates. They will select a local One Health issue into which to take a deep dive, with some ideas including: loss of biodiversity, climate change, and zoonotic disease. We cannot wait to see what topics they decide to tackle! Look for an update on this year’s internship in the summer newsletter.

Funding

The ICM continuously seeks outside funding to supplement the funds we receive as a core department of the Zoo and from individual donors. In 2024, we were successful in securing \$60,000 in grant funds through the Zoo’s Field Conservation program and Washington University in St. Louis’ Here and Next program. We will work with our partners to use these funds in support of these conservation projects:

- Expand the understanding of Galapagos Giant Tortoise microbiomes
- Provide advanced veterinary training for Malagasy Veterinarians (Madagascar)

Publications

We have also been busy sharing our work at scientific conferences and in journals. Here are 8 of these, with ICM students and staff indicated in bold

- **Apakupakul K, Nieto-Claudin A, Rakotonanahary TF, Catenacci LS, Rasambainarivo F, Randrianarisoa S, Sacristán C, Madueño E, Raphael BL, Deem SL.** Molecular Identification of *Mycoplasma agassizii* in Confiscated Tortoises in Madagascar. J Wildl Dis. 2024 Oct 22. doi: 10.7589/JWD-D-24-00040. <https://pubmed.ncbi.nlm.nih.gov/39434422/>*



**This research is significant because it contains the first documented cases of the bacterium *Mycoplasma agassizii* in any tortoise species in Madagascar. The evidence in this publication will help conservationists understand emerging infectious diseases that may impact the re-wilding program in Madagascar. Congratulations to Kathleen et al!*

- Brugal, M. P., Moscoso, M. B., **Nieto-Claudín, A., Deem, S. L.**, Siddons, D. C., & Cáceres, R. C. (2024). The fungus *Aphanoascus galapagosensis* affects bacterial diversity of Galapagos giant tortoise carapaces. *Journal of Applied Microbiology*, Volume 135, Issue 8, August 2024, lxae202, <https://doi.org/10.1093/jambio/lxae202>
- Buege Donovan, Emily; **Blake, Stephen; Deem, Sharon L.**, Moldowan, Patrick D.; **Nieto Claudín, Ainoa;** Cabrera, Freddy; Peñafiel, Cristian; and Bastille Rousseau, Guillaume. Using non-continuous accelerometry to identify cryptic nesting events of Galapagos giant tortoises. *Animal Biotelemetry* 12, 32 (2024). <https://doi.org/10.1186/s40317-024-00387-w>
- da Paz, T.Y.B.; Hernández, L.H.A.; da Silva, F.S.; Cruz, A.C.R.; da Silva, S.P.; Fuzii, H.T.; Massafra, J.M.V.; Vianez Júnior, J.L.S.G.; **Deem, S.L.**; Oliveira, L.d.C., De Vleeschouwer, K.M. and **Catenacci, L.** 2024. First Description of Loreto Virus in Three Culicidae Species from the Atlantic Forest, Bahia, Brazil. *Viruses* 2024, 16(11), 1674. <https://doi.org/10.3390/v16111674>
- **Deem, S.L.** 2024. One Health and the wildlife rehabilitator. *Wildlife Rehabilitation Bulletin*. 42: 1–5. <http://dx.doi.org/10.53607/wrb.v42.272>
- Lawrence, Ted J.; Geoffrey K. Kangogo, Avery Fredman, **Sharon L. Deem**, Eric M. Fèvre, Ilona Gluecks, James D. Brien, and Enbal Shacham authored a recently published article titled “Spatial examination of social and environmental drivers of Middle East respiratory syndrome coronavirus (MERS-CoV) across Kenya”, *EcoHealth*, June 25, 2024. <https://doi.org/10.1007/s10393-024-01684-9>
- **Nieto-Claudin, A., Palmer, J.L., Brenn-White, M.,** Esperón, F., and **Deem, S.L.** Hematology and plasma biochemistry reference intervals of Española, San Cristobal, and Eastern Santa Cruz Galapagos tortoise species. *Conservation Physiology*, Volume 12, Issue 1, 2024, coae055. <https://doi.org/10.1093/conphys/coae055>
- Perea Brugal, M., Burbano Moscoso, M., **Nieto-Claudín, A., Deem, S. L.**, Siddons, D. C., & Caroca Cáceres, R. (2024). The fungus *Aphanoascus galapagosensis* affects bacterial diversity of Galapagos giant tortoise carapaces. *Journal of Applied Microbiology*, 135(8), lxae202. <https://doi.org/10.1093/jambio/lxae202>

Presentations

Ainoa Nieto Claudin attended the 8th World One Health Congress in Cape Town, South Africa. She presented this poster on our work in Madagascar on tortoises. (A number of our ICM alumni were also in attendance at the conference!)



Palmer, J.L., Raphael, B.L., Rakotonanahary, T., Nieto Claudin, A., Bartlett, S., O'Brien, S., Perry, S.M., Musgrave, K., Merkel, J., Nelson, S., and Deem, S.L. Incorporating Pre-release Health Protocols in the Radiated Tortoise (*Astrochelys radiata*) Reintroduction Program. In: 22nd Annual Symposium on the Conservation and Biology of Tortoises and Freshwater Turtles, Tucson, Arizona, 2024. Pp. 57-58.

Palmer, J.L., Uiterwaal, S.F., Farook, S., Deem, S.L., Taylor, C., and Blake, S. Poor Hibernaculum Quality Associated with Mortality in Urban Box Turtles (*Terrapene mexicana triunguis*). In: 22nd Annual Symposium on the Conservation and Biology of Tortoises and Freshwater Turtles, Tucson, Arizona, 2024. Pp. 57.



Uiterwaal, S.F., Dell, A.I., Deem, S.L., Palmer, J.L., and Blake, S. Movement ecology of an urban wildlife community: Cross-species movement patterns are linked spatial variation in community composition. GRC Conference (Towards a Predictive Ecology of the Anthropocene), Manchester, New Hampshire. 2024

People

- Dr. Lilian Catenacci, Brazilian veterinarian and adjunct ICM scientist, presented at the annual ABRAVAS conference in Brazil (see photo). On the last day she was awarded with the best presentation. We are so proud of Lilian and the amazing work she leads in Brazil.
- Dr. Sharon Deem completed her term as President of the American Association of Zoo Veterinarians (AAZV) in October. She continues to help lead the AAZV as Immediate Past President.
- Gislayne Mendoza, biotechnologist with Charles Darwin Foundation in Galapagos, spent 2 ½ months with the ICM this fall (Aug-Oct). Gis trained in molecular diagnostics, hematology, and field techniques. She also had an opportunity to give a presentation at Saint Louis University on her adenovirus work with Galapagos tortoises. We loved hosting Gis and know she will go on to do great things in conservation medicine.



Lilian with award from ABRAVAS conference, Brazil.

Employee Spotlight

Kathleen Apakupakul, M.S., M.A.
ICM Research Associate



Kathleen hiking Mt. Rainier

In 2015, Kathleen joined the ICM team as a research scientist and laboratory manager. Her background in conservation science, evolution, and molecular biology make her an invaluable resource for the ICM's wildlife research. In her lab at the St. Louis Zoo, Kathleen conducts molecular evaluations of wildlife samples. Her diagnostic testing reveals all sorts of valuable information about an animal's health, diseases, and even their sex. In addition to bench work and computer work, Kathleen also enjoys spending time in the field assisting ICM technicians and veterinarians.

Favorite aspect of her job: Because we work on several projects, I love learning new things about systems that I'm unfamiliar with in the course of conducting research and reviewing the literature, and then trying to piece it all together into a narrative that fits within the context of our findings. I also like to puzzle out new lab protocols, especially when they work on the first try.

Current Projects: Right now I'm testing out our mobile lab, aka "lab in a backpack", for use at our field sites. I also train students in molecular techniques for use in wildlife health applications.

Fav Animals: I like marine invertebrates, especially cephalopods (e.g., octopuses, cuttlefish) and blue crabs



Gis and Kathleen in the ICM laboratory.

- Sharon was on-hand to congratulate Washington University student, Kaseba Chibwe, after they successfully defended their PhD proposal defense. Kaseba's collaborated with the Zoo to research the three toed box turtle microbiome.
- After completing a two year post-doc with the Forest Park Living Lab, Dr. Stella Uiterwaal accepted a position at the Smithsonian Institute, Front Royal Campus. (Congratulations!) Stella presented the FPLL's bird survey research at the Wildlife Society meeting in Baltimore this fall.'

ICM Newsletter

Winter 2024



Madagascar Radiated Tortoise

We hope you enjoyed this newsletter. I cannot thank each of you enough for believing in the ICM. Your support not only helps with the work we do, but it also provides opportunities for the next generation of conservation medicine practitioners to learn and work with us as they move into the next stages of their careers.

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 mailed to:

Institute for Conservation Medicine,
Saint Louis Zoo,
P.O. Box 790290,
St. Louis, MO 63179-0290.

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 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/ICM.

Our Mission:

The Saint Louis Zoo Institute for Conservation Medicine takes a holistic approach to wildlife conservation, public health, and sustainable ecosystems to ensure healthy animals and healthy people.



Saint Louis Zoo

Institute for Conservation Medicine

Healthy Animals. Healthy People.