

Institute for Conservation Medicine Newsletter

Fall/Winter 2022



Research Projects Health Assessments and Student Workshops in Madagascar

Thanks to generous funding from a donor to the Saint Louis Zoo, ICM and the Department of Animal Health continued our collaboration with the Turtle Survival Alliance to conduct health assessments of radiated tortoises in Madagascar confiscated from wildlife traffickers. Jamie Palmer, Dr. Ainoa Nieto Claudin, Dr. Kari Musgrave (DAH), and Sarah O'Brien (DAH) all traveled to Madagascar in mid-November. They successfully placed pit tags in 2,000 tortoises and conducted health evaluations of 159 tortoises. Not only are we making sure these animals are healthy before being released back into the wild, but the data collected will provide valuable information about this endangered species.



Workshop team: Fidisoa Rasambainarivo, Ainoa Nieto Claudin, Kathleen Apakupakul & Lillian Catenacci



Field team: Jamie Palmer, Sean Perry, Bonnie Raphael, Ainoa Nieto Claudin, Kari Musgrave, Stephen Nelson, Sarah O'Brien, Tsahita Rakotonanahary

In late November, Kathleen Apakupakul also traveled to Madagascar to conduct a molecular lab workshop for local Malagasy biologists, veterinarians and veterinary students. Kathleen received a WildCare Institute Field Conservation Grant

and partnered with Dr. Fidisoa Rasambainarivo to make this workshop possible. Working with Kathleen were Drs. Lillian Catenacci (ICM affiliate researcher from Brazil) and Ainoa Nieto Claudin. These three ICM team members taught students how to test blood and swab samples for infectious diseases using PCR testing. The students learned about the health assessments of the confiscated radiated tortoises, which provided a perfect example why prompt, in-country results are so important for conservation. The objective of this workshop was to build local capacity for disease testing and eliminate the need to export research samples to western countries.



Field team performing health assessments on Radiated tortoises in Southern Madagascar



Lillian testing radiated tortoise samples for infectious diseases



Kathleen testing radiated tortoise samples for infectious diseases



Galapagos Tortoise Movement and Ecology Programme (GTMEP)



Ainoa Nieto Claudin and Freddy Cabrera performing a giant tortoise X-ray

Drs. Sharon Deem and Steve Blake traveled to the Galapagos this past summer. They, along with the GTMEP team that included Dr. Ainoa Nieto Claudin and Emily Donovan, a Ph.D. student at Southern Illinois University, started a study to evaluate reproductive fitness of female giant tortoises using a mobile X-ray machine. The team worked in the Cerro Fatal region

and was able to get X-rays of all 15 tagged females at regular intervals during the summer. This study is the first of its kind and will allow us to understand the reproductive success of migrating versus non-migrating females. The Charles Darwin Foundation put together a video of the work that has been shared extensively, and which may be found on their Facebook page.



Guillaume Bastille-Rousseau and Freddy Cabrera performing a giant tortoise X-ray

Under the supervision of Dr. Nieto Claudin, five local students from Galapagos and Ecuador are conducting research for their undergraduate degrees in biology. As part of this work, we are describing for the first time the cause of the white growths that some tortoises have on their carapaces: the fungus *Aphanoascella galapagosensis*. More research will be conducted to determine how this fungus may affect tortoise health. Another study carried out by local student Karina Ramon highlighted a new threat for tortoises as we have shown that these animals are eating significant amounts of plastics when roaming near human-modified areas of Santa Cruz Island. These results will be used to inform local management decisions and propose specific conservation actions to reduce plastic pollution in Galapagos.



Lilian collecting samples from birds in Brazil

Viral Pathogens in Brazilian Wildlife

Dr. Lilian Catenacci and her team continued tracking West Nile virus and other arboviruses circulating in Northeast Brazil. To date they have collected samples from more than 600 wild birds, 400 horses, 200 bats, 120 primates and 300 pools of mosquitoes. These data will provide information about the prevalence of Saint Louis Encephalitis virus, Ilheus virus, West Nile virus and other zoonotic viruses in Brazil. These samples also have been tested for coronavirus and influenza and fortunately these do not seem to be present in the study sites. Lilian's team includes four local students, two conducting research for undergraduate degrees in veterinary science and two conducting work for their master's theses in animal science.

Since August, Lilian has been assisting Brazilian health and animal agencies to determine the cause of a disease outbreak in wild birds in Northeast Brazil. More than 3,000 birds, mainly pigeons, were found dead in rural and isolated areas. During extensive fieldwork, Lilian and her team captured some live birds and collected a few dead birds for diagnostic

testing. The live animals showed neurological symptoms, with the main suspects being Newcastle, West Nile, Ilheus, or Saint Louis viruses. After running PCR tests to narrow down the suspected viruses, further analysis using qPCR testing showed the presence of flavivirus and Newcastle virus. After specific gene sequencing was completed, all the samples were confirmed positive for Newcastle virus.



Field lab in Brazil



Lilian also has presented three free training courses in Brazil since August. The goal of the first was to improve the reporting of outbreaks associated with neurological disorders in animals, the second course was to improve health professionals' ability to analyze data from the Brazilian health system, and the goal of the last course was to improve health professionals' ability to identify vectors. Representatives from the Brazilian Ministry of Health, animal health agencies and Brazilian research institutions were present. The overall goal of this surveillance and training was to mobilize the Ministry of Health to carry out arbovirus diagnoses in humans at the state level. The hope is that in 2023, the response time for diagnosing arboviruses in humans can be reduced from more than one year to a few days. This is a clear example of how animal and human health are connected and how wildlife can help people's health!

Bolivian Dolphins



Field team briefing before river dolphin captures

In October, Dr. Sharon Deem traveled to Bolivia as part of the partnership with the Maryland Zoo in Baltimore and the Noel Kempff Mercado National Park Museum in Santa Cruz, Bolivia. Two young female pink Bolivian river dolphins were trapped in an artificial canal system in a large agriculture system in the San Pedro region of Bolivia. During the rainy season, flood waters are deep and can cover wide swathes of land. The dolphins swim



Sharon and partners in Bolivia performing health assessment on Bolivian river dolphin

beyond the boundaries of their natural river system and into the artificial canals built for agriculture. However, when the waters recede in the dry season, dolphins become trapped in isolated bodies of water.



Bolivian team corrals river dolphins in Bolivia

These lagoons and lakes are not ecologically healthy enough to sustain the dolphins, and they need to be physically moved back to the free-flowing Rio Grande river. During the relocation efforts, Sharon performed complete health evaluations on each animal, including ultrasounds, and then satellite telemetry tags were placed on the dolphins to monitor their river use post-translocations. Very little is known about these endemic dolphins, and the health assessment data are important for ongoing conservation efforts for this species.



Preparing river dolphin for transport to new home

This third rescue trip involved not only relocating the dolphins back to their river homes, but also provided capacity building so local teams can continue future dolphin rescue efforts. With our assistance, Noel Kempff Mercado submitted a grant proposal to Loro Parque to fund this ongoing work. Sharon gave an interview to a Reuters reporter about the trip, which led to a number of news releases.



Going Wild in Forest Park



Raccoon post health assessment release

The Living Lab project in Forest Park continues to gain strength.

We now have 11 box turtles, two snapping turtles, five raccoons and one great horned owl with telemetry tags that allow us to

track their movements. This allows us to better understand their habitat needs. We continue to add new species to the study, with water birds and squirrels next in line. More importantly, we have been bringing our love of the park to many through fun educational sessions at the St. Louis Children's Hospital and a number of internet outlets. Check out the new Forest Park Living Lab website: forestparklivinglab.org.

Health Diagnostic Center for infectious disease testing. Our preliminary findings show that the mesocarnivore community is exposed to several zoonotic pathogens such as West Nile virus, Bourbon virus, Toxoplasma gondii and Lyme disease and also is exposed to common domestic feline/canine viruses such as canine distemper virus, canine parvovirus or feline parvovirus, among others.



Fernando and John Hewlett flying surveys to locate Bobby

Dr. Fernando Najera continues to track the movement of Timmy, the bobcat at Tyson Research Center and Jamie Foxx, the red fox at Saint Louis Zoo WildCare Park. Unfortunately, Bobby, the other collared bobcat,

is missing. John Hewlett, a pilot from Kentucky, generously volunteered to fly his plane over Bobby's known territory in an attempt to locate him. Fernando and Murray State graduate student Michelle Weaver were able to conduct telemetry from the plane, but unfortunately, no signal was detected. We are grateful to both John and Michelle for volunteering their time and resources in this endeavor.



Canid team: Fernando Najera, Victoria Galina, Bri Hawkins, Jamie Palmer, Laura Budd

Canid Conservation Initiative (CCI)



Curious coyote caught on camera trap at Tyson Research Center

The CCI field season began in October with camera and physical traps set at both WildCare Park and Tyson Research Center. So far we have caught one bobcat, nine opossums, and 15 raccoons. We conducted health

assessments on all 25 animals, and the juvenile bobcat received a GPS collar we will use to track her movements for the next six months. Samples from a total of 34 animals from the previous trapping season were submitted to Cornell University Animal



Juvenile bobcat at Tyson Research Center

In more exciting carnivore news, one of the female bobcats at Tyson that we have been monitoring with our camera traps since last year showed up on the trail camera earlier this summer with four kittens. Based on the most recent footage, it looks like three of the kittens are doing well. Raising four kittens successfully would have been an impressive accomplishment, and it's just a reminder to us of the difficulties of being a wild animal in the world.

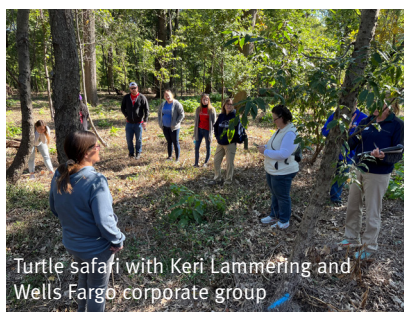


Outreach



Turtle safari with Keri Lammering and Wells Fargo corporate group

Turtle safaris were wildly successful in 2022. A total of 20 individual or family events took place, including five that were booked as birthday gifts, along with one larger school group. These turtle tracking experiences continue to be a wonderful way of getting both children and adults into the woods to meet turtles and learn about local and global One Health topics. Keri Lammering leads these events with assistance from Jamie and ICM interns. A turtle safari was also held with Wells Fargo employees, and we were so pleased to read one participant's quote, "I have to say, the two people that the Zoo sent to lead the turtle tracking did an EXCELLENT job. They were friendly, funny, and great at educating and engaging us. I hope you pass this feedback on to them!" Tracking experiences also were provided as a field trip for a few school groups and to the Zoo's Teen Camp.



Turtle safari with Keri Lammering and Wells Fargo corporate group

Jamie presented the Zoo's work on the health of Cuban crocodiles being raised in Cuba at the International Union for Conservation of Nature Crocodile Specialist Group meeting in Chetumal, Mexico, in July. Her talk was titled "Hematology and Blood chemistry in

Cuban crocodiles (*Crocodylus rhombifer*) at the Zapata Crocodile Farm in Cuba." After her presentation, she had great follow-up discussions with our international participants. This WildCare Institute Program is a partnership between ICM, the Zapata Crocodile Farm, and now the Philadelphia Zoo through Lauren Augustine.

As part of the Association of Zoos and Aquariums Reduce the Risk program, an article was published in their magazine CONNECT, which included information on the Saint Louis Zoo, ICM and our One Health work.



990 likes
stlzoo Have you heard of turtle racing? Sometimes, these races pop up as entertainment in summertime fairs and events. But this activity is often harmful for the animals involved.

Social media post on One Health Day

One Health Day was Nov. 3, and ICM worked with the Zoo's social media team for various posts to both Facebook and Instagram to celebrate the day.

Before leaving for Spain, Ainoa gave lectures about the Galapagos Tortoise Program and One Health to the National Park guides and one to a group of visiting scientists in Galapagos. The visiting scientists included Nobel Prize winners Erwin Neher and Richard Roberts (Nobel Prize for

Medicine) and Aaron Ciechanover and Richard Schrock (Nobel Prize for Chemistry).

Ainoa also presented additional talks about the Galapagos Tortoise Movement Ecology Programme at the Symposium Galapagos-Israel, Endeavour Cruise, ATBC conference in Colombia, Galapagos Day in UK, and Annual Ecuadorian Biology Conference, along with local events with national park guides and families in San Cristobal.

The Living Earth Collaborative hosted a symposium at the Zoo in October titled "Microbes of Diverse Ecosystems: Research Happening in St. Louis." Sharon was a keynote speaker, and she presented "One Health: The Little Ones that Rule the World."



Ainoa (3rd from right) and her committee at the Universidad Complutense de Madrid

People

In November, Dr. Ainoa Nieto Claudin gave an excellent defense of her Ph.D. dissertation (for which Dr. Deem was her mentor) at the Universidad Complutense de Madrid in Madrid, and many in ICM were able to attend via Zoom. We are so proud, of her! We appreciate all the Zoo support we have been able to give Ainoa and the Galapagos Tortoise Movement Ecology Programme these past years. We look forward to continuing our work with Ainoa in the future.



Ainoa during her dissertation defense

ICM was fortunate to have four summer interns in 2022, all of whom exceeded our expectations (which were already high!). Carly Etter (SIU-C), Brianna Hawkins (ASU), Nate Phillips (Cornell College), and Erin Sedlacek (SIU-C) assisted with box turtle and canid projects as well as data collation and organization. This fall we've had three very hardworking interns: Bri stayed on after summer and was joined by Victoria Christianson Galina (WashU) and Abbie Harville (Zoo employee and WashU grad). They have all been a tremendous help with many aspects of the Canid Conservation Initiative fieldwork and data entry.

Funding

We were excited to receive an Institute of Museum and Library Services (IMLS) award in September for \$178,618. Keri Lammering is leading the project, One Health Education Now for Empowering Tomorrow's Leaders, and will work with school districts in north St. Louis County near WildCare Park. We will work with teachers and high school student interns to develop a three-week One Health curriculum using experiential learning. Each classroom will research a local, One Health issue selected by the students, conduct hands-on sampling, take a field trip to explore nature, and learn how to communicate scientific concepts. The IMLS grant includes paid internships and stipends for teachers. The total project value is \$361,560, with the Zoo providing matching funds of \$182,942 for employee salaries.

We were awarded a Washington University St. Louis - Living Earth Collaborative grant for our work in Kenya. \$29,992 awarded to Shacham, E., Deem, S.L., and Miller, A. "Ecological Niche Modeling to examine the interactions between climate-related environmental change, food security, landscape diversity and an emerging infectious disease." The grant period is September 2022 through December 2023.

We were awarded two Field Conservation grants from the WildCare Institute, both to build capacity of next-generation conservationists in 2023. One will fund the genetic research of Emily Donovan, a Ph.D. student at Southern Illinois University, on giant tortoises in Galapagos. The other provides funding for Dr. Kelley da Silva, a Brazilian biologist and veterinarian, to train with ICM in St. Louis for four months.

Publications

Book chapters in the newest version of Fowler's Zoo and Wild Animal Medicine:

Baitchman, E., and Deem, S.L. Zoos as One Health Education Centers for Students in the Human Health Professions. In: Miller, R.E., P. Calle, and N. Lamberski (eds.), Fowler's Zoo and Wild Animal Medicine: Volume 10. Saunders Elsevier, Saint Louis, Missouri. Pp.79-83.

Deem, S.L., and Holliday, D. Impacts from Endocrine Disruptor Chemicals on Wildlife Health. In: Miller, R.E., P. Calle, and N. Lamberski (eds.), Fowler's Zoo and Wild Animal Medicine: Volume 10. Saunders Elsevier, Saint Louis, Missouri. Pp. 131-136.

Catenacci, L.S. and Pinter, A. Yellow fever in South American Primates. In: Miller, R.E., P. Calle, and N. Lamberski (eds.), Fowler's Zoo and Wild Animal Medicine: Volume 10. Saunders Elsevier, Saint Louis, Missouri. 2022.

Posters at Conferences

Takenaka, B.P., Lawrence, T. J., Garg, A., Tao, D., Deem, S.L., Fevre, E.M., Gluecks, I., Sagan, V., Shacham, E. A global examination of ecological niche modeling to predict emerging infectious diseases: a systematic review. American Public Health Association Conference. November 6-9, 2022. Boston, MA.

Apakupakul, K., Brenn-White, M., Budd, L., Palmer, J., Deem, S., Mantilla-Calderon, D., Zhang, L., Liu, G., and Ling, F. Expanding the toolset for chelonian conservation: Understanding the diversity, distribution, and dynamics of Terrapene microbiomes. Microbes of Diverse Ecosystems – Research Happening in St. Louis. October 2, 2022. St. Louis, MO.

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

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



Saint Louis Zoo

Institute for Conservation Medicine

Healthy Animals. Healthy People.