The Night Lives of Forest Elephants

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Elephants gather in a bai under the safe cover of night. Photo by Peter Wrege/Elephant Listening Project

“Elusive megafauna” may sound like an oxymoron, but in the case of the Congo Basin’s forest elephants, it is not. Dr. Peter Wrege of the Cornell Lab of Ornithology’s Elephant Listening Project has been recording the sounds of elephants for 10 years in Central Africa, often in natural clearings called bais, where elephants gather to socialize and drink mineral-rich water. Observing large mammals in clearings may sound easy, but 80 percent of elephants’ activities at bais now take place under cover of night, a shift in behavior in response to human activities in the daytime. In addition, elephants communicate using a range of vocalizations, most of which are below the range audible to human ears.

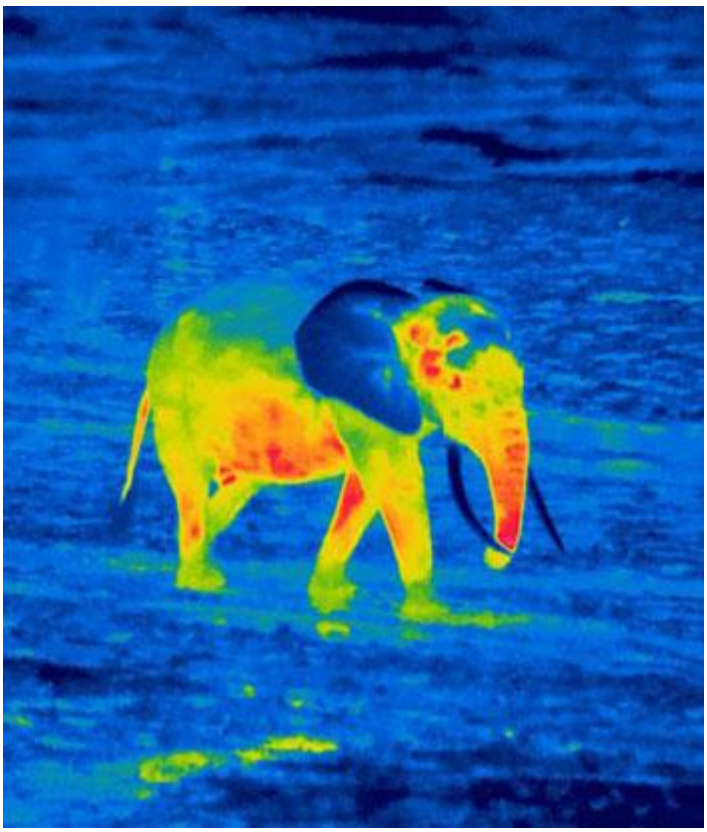
Peter Wrege and team deploy acoustic recording units in Gabon. Photo by Michelle Gadd/USFWS

To reveal what these secretive giants are doing in the dark, Wrege devised audio recording devices to listen to elephant calling activity and deployed night vision and thermal imaging equipment. Bais are hotspots of elephant activity, but unfortunately they also attract humans – poachers in search of ivory. Thanks to acoustic monitoring, Wrege can not only determine how many elephants are visiting a bai and when, but also detect poaching attempts (by recording gunshots) and the impacts of human activities such as encroachment from logging operations and oil exploration. Wrege and colleagues engage with governments, logging companies and local communities to continuously monitor and secure the most important bais.

Wrege's ongoing acoustic projects, supported in part by USFWS African Elephant Conservation Fund since 2009, have made valuable contributions to elephant conservation. Acoustic surveys have been found to estimate elephant numbers as accurately as the standard method of counting piles of elephant dung along straight lines known as transects; they also sample a larger area making them more cost-effective. By measuring the patterns of gunshots in the forest, Wrege and team can help better inform anti-poaching efforts and measure their effectiveness. The recording devices have also helped show other disturbances in the forest, including the arrival of industrial activity and construction: In response to the noise associated with seismic exploration by oil companies, elephants appeared to shift their activities more to the night. The recordings showed This was detected by a lower likelihood of calling during the day and an increase in the likelihood of calling after dark. By knowing which activities are detrimental to elephants, we can recommend better standard practices for extractive industries.

In collaboration with Dr. Andrea Turkalo, a pioneering forest elephant biologist and USFWS grantee, Wrege employed thermal imaging to further investigate elephants' nocturnal activities over a three-year period in Dzanga Bai, in the Central African Republic.

"The thermal work was an eye-opener, visually compelling. It confirmed what we suspected we were hearing," Wrege says. Analysis of thousands of hours of recordings from several bais showed that the composition of vocalization types was different during the night than during the day. "Something was going on at night – different behaviors or a different mix of ages and sexes – but the acoustics alone couldn't tell us."



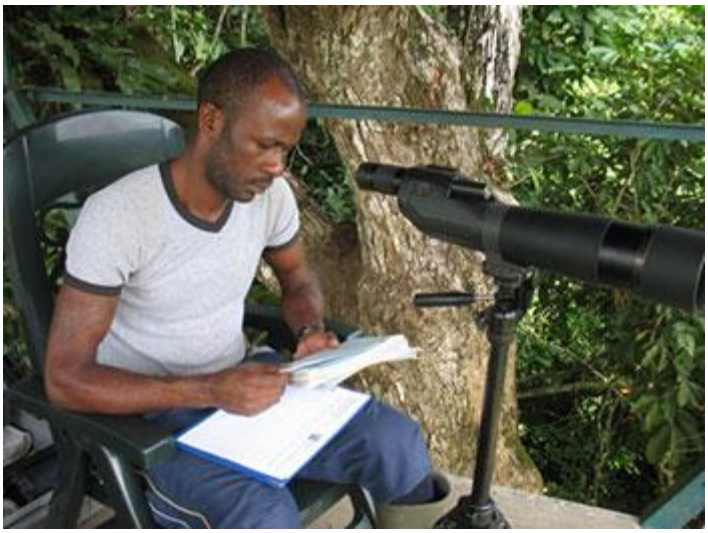
A bull elephant in musth, a period during which adult male elephants are eager to mate. The heat emanating from his temporal glands and other areas can be visibly seen with the use of thermal imaging. Photo by Peter Wrege/Elephant Listening Project

Thermal imaging proved to be a valuable complement to the acoustic information. It enabled Wrege to count individual elephants, estimate sex ratio, record the structure of family groups and link specific behaviors to specific vocalizations. Even more exciting, Wrege could observe the social interactions even on the darkest of nights.

That elephants feel secure enough to mate in bais at night makes bais all the more important to ensuring their future reproduction and therefore survival. Photo by Peter Wrege/Elephant Listening Project

The thermal imaging helped Wrege reveal that bais may be mating hotspots for forest elephants, emphasizing the importance of these sites for elephant conservation. “Elephants’ sexual behavior was an order of magnitude higher after dark,” he says. The number of mature bulls did not increase as it got dark, but many more females and their families began entering the bai after dusk, increasing until midnight. “Maybe there were just more possible mating opportunities with more females around – or perhaps sex under the cover of darkness reduces interference by other bulls.”

Protecting bais is essential to the survival of forest elephants. Wrege is passing his knowledge on and training local biologists in the use of acoustic and other equipment to study forest elephants. As part of this training initiative, Wrege has recently created video tutorials in French and English for analyzing sound data.



Toussaint Ogombet with notebook and spotting scope on an observation platform overlooking a bai. Photo by Peter Wrege/Elephant Listening Project

Toussaint Ogombet is one of Wrege's latest mentees. Ogombet has in turn been sharing his skills with a logging company in Gabon to oversee its wildlife management efforts. The company is supporting his use of acoustics to monitor wildlife as part of its obligations for Forest Stewardship Council (FSC) certification. Two other logging companies active in the area have since expressed interest in using acoustics to monitor and protect wildlife on the land they manage.

Wrege's tenacious and innovative application of technology to conserve elephants persists: He is now establishing a monitoring network to follow elephant activities in an 8,000 square kilometer area in northern Republic of the Congo, including training a dedicated team of four Congolese researchers. As part of this effort he is refining an automated elephant call detector that will expedite the analysis of sound files in situ, and developing a real-time gunshot detection system to reinforce anti-poaching efforts. These efforts will help wildlife managers get information more quickly about changes in elephants' movements and the threats they face – facilitating more rapid and strategic anti-poaching patrols.