



Song Meter in Two Hearted Forest (center left) Photo Courtesy of The Nature Conservancy/Christine Hall

Luce County, Michigan - Luce County is a very rural county in Michigan with thousands of acres of forested lands, far from paved roads and other human disturbances. In Spring of 2016 a sound “thumbprint” was made of this rural landscape, when a Song Meter autonomous recorder was placed in the forest to record sounds for several months. The Song Meter was placed on a remote track owned by The Nature Conservancy on the North Branch of the Two Hearted River. The property location was off of several, progressively narrowing, two-track roads, and then a hike of about a half mile through the woods. The meter was set up in April and taken down in late June. The Song Meter was programmed to record one minute of sound every half hour throughout the day.

“Increasingly, human-influenced sounds are erasing the natural sounds of the earth.”

Many people, especially those in urban environments, have become more “immune” to sounds. There are so many human-made car, plane, construction, and audio sounds that humans tend to ignore the constant blast. Yet if one goes outside in any natural environment and listens intently they will hear birds calling, or crickets chirping, the wind blowing, a creek trickling, or frogs croaking. Those sounds of the natural world are bioacoustics, and they are more than just different from the urban sounds, they are valuable data for scientists and conservationists.

Types of Sound

The sounds of any natural place are inherently unique and can reveal important information about the health of that location. Vocalizations from frogs, birds, bats, mammals, and insects form what scientists call the biophony – sounds from living things. Combined with anthropophony (noise generated by people) and geophony (noise from natural phenomenon like wind and rain), these three elements of sound form the characteristic sound of a place, called the soundscape. There is an emerging new field of ecology called acoustic ecology or ecoacoustics /soundscape studies. They all refer to the relationship of sounds and the

environment. Different things in the soundscape (i.e., birds, amphibians, mammals, wind, and machinery) produce sounds at different frequencies measured in kilohertz (kHz). Luckily the sounds made by biophony – are consistently at a higher frequency (can be differentiated) than sounds caused by anthropophony which is usually at a lower frequency. Geophony sounds created by geophysical processes such as wind and rainfall may span the entire soundscape spectrum.



Song Meter in Luce County
Photo Courtesy of The Nature Conservancy

Indices have been created by researchers (Gage, et al. 2015) to relate these soundscape components to a degree of “naturalness” and are used to examine changes in the soundscape over time.

In the last several years, many articles in the main stream media and several books, the most popular—*One Square Inch of Silence: One Man’s Quest to Preserve Quiet*, (Free Press/Simon & Schuster, 2010) documents how our increasingly human influenced earth erases the natural sounds of the earth. There are very few places where human sound does not intrude. In *One Square Inch*, the author's premise is that he found one place – deep in the Hoh rainforest of Olympic National Park, Washington, that was totally free of human sounds. The author proposes that the natural world is in extreme danger of losing its natural sound “thumbprint.”

Results from Luce

The sounds from the rural forest in Luce County displayed a 24-hour cycle with different types of animals vocalizing at different times. For example, the “dawn chorus” of birds was a very identifiable “finger print.” Later in the day lower frequency animals – such as frogs and toad used their voices. Daily patterns may reflect temporal partitioning of acoustic space by species of animal. Vocalizing animals are believed to find and utilize acoustic spaces (“niches”) that are not filled by other sounds (either biological or anthropogenic), a theory known as the “acoustic niche hypothesis” (Krause, 1987). This niche results in both spatial and temporal separation of calls that might otherwise fall within the same frequency range. The Luce County location had a very low incident of anthropogenic (human caused) sounds and was deemed “very natural” by its sound fingerprint.

The next time you are out in the woods—listen....How much man sound do you hear compared to nature made? The results may surprise you. In today’s world, the Upper Peninsula of Michigan is lucky enough to have areas where nature sounds still dominate.

More Information

Gage, S. H., W. Joo, E. P. Kasten, J. Fox, and S. Biswas. (2015). Acoustic observations in agricultural landscapes. Pages 360-377 in S. K. Hamilton, J. E. Doll, and G. P. Robertson, editors. *The Ecology of Agricultural Landscapes: Long-Term Research on the Path to Sustainability*. Oxford University Press, New York, New York, USA. © Oxford.

Hempton, G, & Grossmann, J. (2007) *One Square Inch of Silence: One Man’s Quest to Preserve Quiet*, Free Press/Simon & Schuster,. 368 pp.

Krause, B., 1987. Bioacoustics, habitat ambience in ecological balance. *Whole Earth Rev.*57, 14–18.