Green frogs in the suburbs are seeing a gender revolution.

A new Yale study shows that estrogen in suburban yards is changing the ratio of male and female green frogs at nearby ponds. Higher levels of estrogen in areas where there are shrubs, vegetable gardens, and
manicured lawns are disrupting frogs' endocrine systems, according to the study. That, in turn, is driving up the number of female frogs and lowering the number of male frogs.

The research appears in the journal *Proceedings of the National Academy of Sciences*. It is based on tests conducted at 21 ponds in southwestern Connecticut in 2012.

Previous studies have shown similar effects caused by agricultural pesticides and wastewater effluent; the new study finds amphibian *endocrine disruption* also exists in suburban locales.

"In suburban ponds, the proportion of females born was almost twice that of frog populations in forested ponds," said lead author Max Lambert, a doctoral student at the Yale School of Forestry & Environmental Studies. "The fact that we saw such clear evidence was astonishing."

David Skelly, the Frank R. Oastler Professor of Ecology at Yale and director of the Yale Peabody Museum of Natural History, is the senior author of the study.

The researchers looked at ponds with varying degrees of suburban neighborhood impact—with entirely forested ponds at one end of the spectrum, and ponds that were heavily surrounded by suburbia at the other end. The sites included ponds linked to both septic systems and sewer lines. In many cases, the researchers needed to obtain permission from homeowners to survey their back yards.

"Our work shows that, for a frog, the suburbs are very similar to farms and sewage treatment plants," Lambert said. "Our study didn't look at the possible causes of this, partly because the potential relationship between lawns or ornamental plantings and endocrine disruption was
unexpected."

Lambert noted that some plants commonly found in lawns, such as clovers, naturally produce phytoestrogens. The simple act of maintaining a lawn, in other words, may be one source of the contamination.

There also are possible implications for other species that use suburban ponds, note the researchers. Those species include other amphibians, such as wood frogs, spring peepers, gray tree frogs, and salamanders, as well as birds, turtles, and mammals.

"Some of our lab's current work is trying to understand how the suburbs influence sexual development in other species," Lambert said.


Provided by Yale University


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