

Salt- The New Endocrine Disruptor? Please.



By Josh Bloom — November 23, 2016



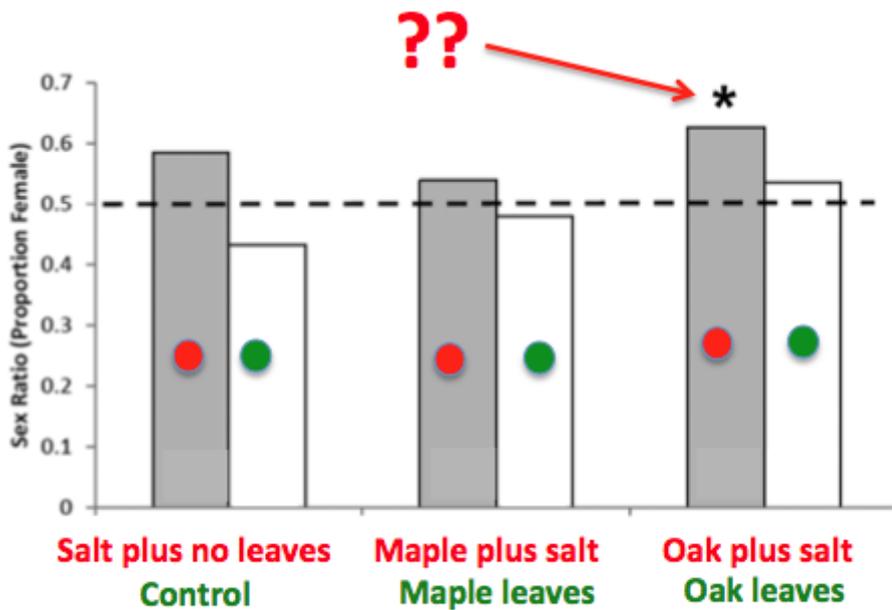
Salt makes frogs male? Bullsalt. Photo: Shutterstock

The folks over at the Environmental Working Group and NRDC must be greeting a new environmental study with mixed emotions.

On one hand, their eternally-growing list of endocrine disruptors—chemicals that supposedly screw with your hormones—has grown by one. On the other hand, the new endocrine disruptor is *salt*, and despite the perennially low quality science that dribbles from their websites, even they must realize how stupid this sounds. Maybe even enough worry that remotely inquisitive individuals might wonder "Hmm. Salt is disrupting my 'endocrines?'" Huh?? Maybe the other endocrine stuff they write about is garbage too."

Which is pretty much what the Council has been saying forever.

Let's look at the evidence that led researchers at the Yale School of Forestry & Environmental Studies and Rensselaer Polytechnic Institute to publish a study entitled "Interactive effects of road salt and leaf litter on wood frog sex ratios and sexual size dimorphism" the *Canadian Journal of Fisheries and Aquatic Sciences*. After all, it would be wrong to let both of their readers to be



Wood frog tadpoles grown with or without salt present*

Right away, it is apparent that this is a gigantic mess. Here's why.

The group looked at the ratio of female to male frogs as a function of tadpole development in the presence and absence of salt. They also threw in leaf litter from two different trees to simulate conditions near roads.

The graph on the left represents the experiment where the tadpoles are grown either with (gray) or without (white) salt. In the middle, maple leaves plus salt is compared to maple leaves alone, and on the right, the same with oak. Although the group suggests that salt may have "masculinizing" properties, it's all in the statistics. Here's why.

The salt vs water group (left) does seem to show that the ratio of males to females does go up when the tadpoles are raised in salt, but the data are not statistically significant, so you might as well be showing a photo of a toaster as evidence. When maple leaves are added, these "non-real differences" become even less real. The two groups are essentially the same. But, when oak leaf litter is used, there is a small difference between the two groups—roughly 0.52 vs 0.62, although this is the *only* experiment in which the data reach the level of statistical significance (asterisk).

This is typical of garbage science studies. Council advisor, Dr. Stan Young, a biostatistician, has seen this "funny math" many times. It is called multiple testing.

"The authors are asking a lot of questions, one at a time. But if you get to ask a lot of questions then the odds are that one might be statistically significant by chance alone. You have to count the number of questions asked, and then list the p-values. Then multiply each p-value by the number of questions to get the Bonferroni adjusted p-value. If the adjusted p-value is not less than, say, 0.05,

there is nothing going on."

Stan Young, Ph.D.

So, I might as well just substitute another title, which would seem to be just as valid:

"Oak Leaves Turn Female Frogs into Male Frogs."

Another one for the compost heap.

Notes:

(1) OK, that wasn't very nice. The 2014 impact rank of Canadian Journal of Fisheries and Aquatic Sciences was 2996 out of 11,000+, which isn't all that bad.

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