THE LAKELAND TIMES
# OUTDOORS
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## Fish like a GIRL

### The bees knees

By Beckie Gaskill
OF THE LAKELAND TIMES

I am not sure where that saying came from, but saying something is the "bees knees" means something is excellent, top notch or the best of the best. I suppose bees deserve that designation, however. If we look at pollinators and how much we depend on their services at our dinner tables (and every other meal as well), then I would suppose the whole bee is pretty top notch.

The reason I bring up bees again is another book recommended from a recent presentation I attended. It has actually been recommended to me more than once, so I finally searched out a copy. It is from the Xerces Society, which is dedicated to preserving pollinators of all types. The book is called "The Xerces Society Guide to Attracting Native Pollinators: Protecting North America's Bees and Butterflies."

It did not take me long to get into the book far enough to learn some pretty cool things about bees. For instance, in honey bees, the Queen does not have any "authority" as we would think of it. She is not in control of the other bees. They simply act in their own best interest to preserve their species and genetics. All of the bees in the hive are related, which, the book said, is likely behind the level of cooperation needed to achieve their success.

Some honey bees construct and repair the nest, while others serve as guards and still others act as nursing bees, tending to the larvae. Then, of course, there are the foragers who leave the super-organism that is the colony. Each bee is born with a job, essentially, and no questions are ever raised. I suppose that is a bit of an anthropomorphism. As humans, we tend to see animals, even insects, as having human qualities of thought and reason. Certainly, if bees had those traits, there would be Trouble in Bee Hive City! With no central authority, as we would see it, I doubt our society would run the same as a bee hive. But that is neither here nor there. Learning more about the social constructs of bees in this book opened my eyes even more to how these little guys (and girls) live and survive.

I also learned the honey bees are perennial, where bumble bees are annual. For gardeners,

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## SNAGGED IT

A juvenile American bald eagle raises its wings to maintain its balance while perched at the top of snag tree overlooking the Powell Marsh on Sunday, Oct. 23, in Manitowish Waters.

**DEAN HALL**/LAKELAND TIMES

# Study looks at consumption of venison as a possible pathway for PFOS

By Beckie Gaskill
OF THE LAKELAND TIMES

Per- and polyfluoroalkyl substances (PFAS) are a group of chemicals used to make fluoropolymer coatings and products that resist heat, oil, stains, grease and water, according to the Centers for Disease Control (CDC). They can be found in a variety of products including clothing, furniture adhesive, non-stick cooking surfaces and insulations of electrical wiring. Many PFAS, including including perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are of special concern because they do not break down in the environment. They can be moved through soils and can contaminate drinking water. PFOS and PFOA can also bioaccumulate in fish and animals such as deer. A recent presentation at the Great Lakes PFAS Summit looked to see if venison could be a PFOS exposure pathway for humans who consume venison from deer exposed to PFAS.

Tony Rodolakis and Amy Quintin from WSP Global were the presenters for the session. Rodolakis said WSP was approached by stakeholders to look at the issue. While it is known that PFAS can bioaccumulate in animal tissue, he said, including deer, studies that link PFAS in edible meat to contaminant sources were absent in scientific literature.

"So the resulting knowledge gap made it really difficult to predict risks to human consumers of dear meat from concentrations of PFAS in abiotic media." he said.

Rodolakis said his team conducted their own desktop study in an attempt to determine if venison could be ruled out as a significant PFAS exposure pathway. The study first developed a model to product PFAS in edible deer meat from surface water concentrations and then could derive a protective health screening value. The model would then compare the predicted tissue concentrations to that health screening value, and would conclude with an uncertainty assessment and sensitivity analysis.

Rodolakis then continued with how risk was evaluated and how exposure analysis was conducted. Risk communication, he said, was an important factor in all of this. When PFAS is detected in an area, people "grab onto this and send all the sirens running," he said. What is seldom discussed is what those particular concentrations mean for humans and exposure. For that reason, risk communication became an important part of his project.

The study looked at PFAS at 18 locations. He decided to concentrate his study on PFOS specifically as scientific literature has determined the PFOS biomagnified more then PFOA and PFBS in many species of wildlife. Animal feeding studies also pointed to PFOS taking longer to eliminate from the body PFAS combinations.

The European Safety Authority also recommended a tolerably daily intake cost that was 10 times lower than that of other PFAS compounds for humans. PFOS, then, has been identified as more toxic than other compounds. PFOS then would give a "worst case scenario" type of endpoint. It was also found at higher concentrations at sites than other PFAS compounds.

He then discussed the specifics of the study further. They calculated things such as average body weight of deer, water intake rate and elimination rate. All of this worked out to 0.7 ug/kg (millograms per killogram) of PFOS in an adult deer, Rodolakis said. They then converted total mass to edible meat and found 45% of PFOS accumulates in deer muscle and 42% of that muscle is edible. This means 11 ug/kg was the final exposure concentration at a surface water concentration of 1 ug/kg.

Quintin then took over the discussion, pointing to a site in New England from which the study was drawing data. Hunting patterns within the study area were researched and found an average number of deer harvested per year at 63, leading to 3,874 pounds of meat. With an average number of hunters per year sitting at 47, according to the state fish and game department there, this would be 82.4 pounds of deer meat per hunter per year. Broken down, this would give a consumption rate of 102 g/day or approximately 0.25 pounds per day, or the equivalent of an eight ounce meal 14 days per month.

When looking at toxicity assessment, Quintin said, she started with looking at how much it accumulates in deer and what effects those accumulations had. This lead to a deer consumption screening value, which is essentially a consumption advisory, she said, much the same as people are more used to with fish consumption. The Regional Screen-

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# Green

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ference. Beans, lentils, peas, nuts and seeds are all plant-based alternatives mentioned in the guide.

It is also important to remember, however, that many places, such as the central and western United States sustainably graze animals such as cattle and bison. The key, they said, was to find responsible producers and to patronize them first.

### Caulk it up to savings

Tip six is to seal up energy stealers around the home. Caulking windows, for instance, can help reduce the amount of energy used in a home while still keeping its inhabitants warm and cozy.

Basic home insulation can do as much to reduce a carbon footprint as replacing old single-pane windows with the newer more efficient varieties. The U.S. Department of Energy has online resources to help home owners better understand the R-Value of insulation and what would be best suited to their needs.

### Recycling

The last tip has to do with recycling: "When in doubt, leave it out," the guide offered. While 16 million tons of carbon emissions is saved every year by recycling, attempting to recycle items that are not recyclable can be problematic. They can cause equipment breakage and repairs and increase costs. Some of the most common things that cannot be recycled include #5 plastic, which is commonly used for hot and cold food containers and #6 plastic or polystyrene, which is used on carry-out containers, packing peanuts and egg cartons. Plastic wrappers and bags, too, should not be recycled. Also, plastic with a "PLA" designation on the bottom is compostable, rather than recyclable.

Finally, the excitement exhibited by one person can be contagious. That green thinking can catch on, leading others to take steps to greener living as well. For more information, see the Nature Conservancy website at nature.org.

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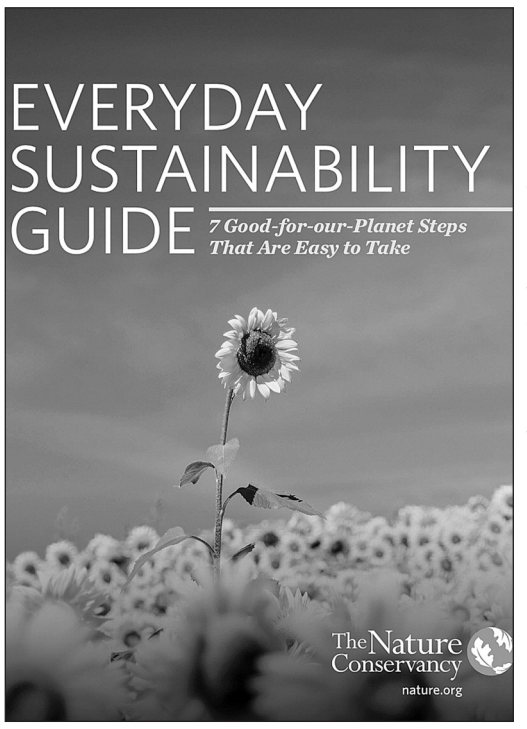


The Nature Conservancy recently put out a sustainability guide, highlighting small steps a person can take that make a big difference in their carbon footprint.

CONTRIBUTED IMAGE

# PFOs

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ing Calculator used by the U.S. Environmental Protection Agency (EPA) for fish ingestion was used as were default exposure assumptions from the EPA for fish ingestion. The consumption recommendations take only adults into consideration, not children.

Once calculations were complete, the Deer Consumption Screening Value landed at 1.6 ug/kg. This was based on 14 eight ounce meals per month at a target hazard quotient of one. With a surface water concentration of 1 ug/L, the exposure rate, considering the values above, would be 11.4 ug/mg. Only where the concentrations of PFAS of 0.1 ug/L were concentrations below the Deer Consumption Screening Value of 1.6 ug/mg.

"Basically, for any concentration in surface water above 0.1 microgram per liter, the model is calculating a concentration in edible meat that is above those screening levels," she said.

This model, she said, points to the fact that this could be a significant pathway for PFOS to humans.

There were some uncertainties in the study as well. First, the model assumed deer were exposed to PFOS only through surface water. It did not take into account exposure through food. The model, she said, also assumes a steady surface water concentration.

When looking at consumption screening values, the model assumed consumption by adults only, as the EPA calculator used does not consider children in the numbers. It also assumed that all meat was consumed by the hunter and that hunters consumed muscle only. PFOS can also be taken up into other tissues such as the liver, but that was not considered in this study as there is already a consumption advisory in place in that area for organ meat due to heavy metals and other contaminants.

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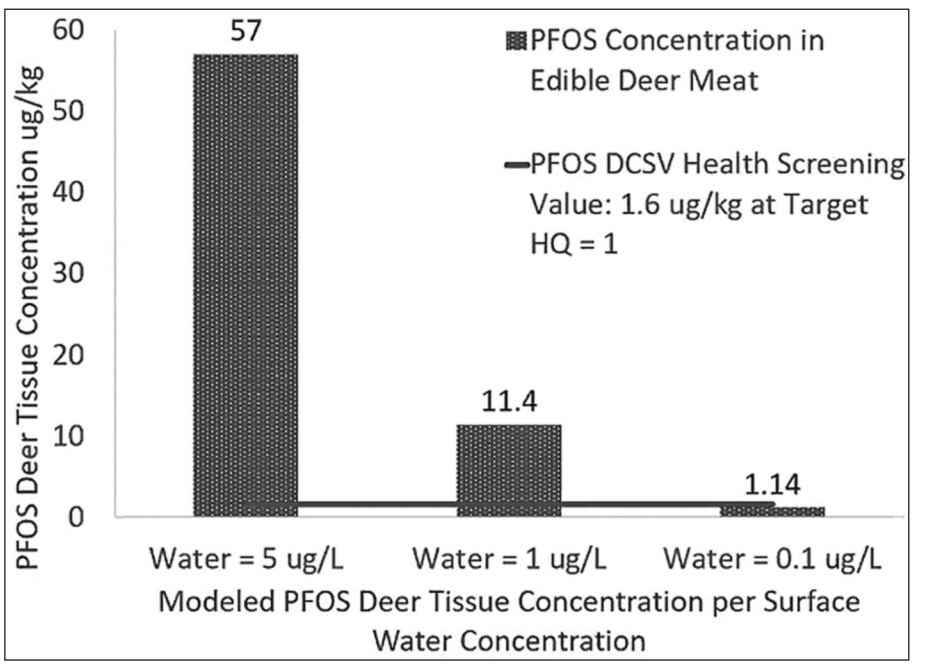


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A recent study looked at concentrations of PFAS in surface water and how that may create a pathway for PFOS from deer to humans who consume venison from those deer. Only at a 0.1 microgram per liter of PFAS in surface water would concentrations in venison come in under the consumption recommendation of 1.6 ug/kg, based on consumption of eight ounces of meat on average of 14 times per month.

# Gaskill

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think in terms of perennial and annual flowers, and the meaning is clear. Honey bees live through winter and other periods with a lack of flowers by feeding on their large stores of honey. They shiver together in clusters to keep warm.

The fact that honey bees are perennial in nature allows for their colony size to grow quite large, the book said. Here is a statistic that somewhat shocked me. I had no idea how big these colonies could get.

"A large, healthy colony may have 50,000 or more workers and a queen laying 1,000 eggs per day," the book said. It also said, in order to support a colony of this size, foraging bees might fly as far as three miles from the nest to reach pollen and nectar. A particularly good source of nectar may lead foraging bees to travel twice that distance. I cannot imagine being as small as a bee and traveling up to six miles. I understand this is their life's work and sole purpose, but it is still quite the undertaking, if you ask me. The more I learn about bees, the more amazing they are to me.

Another interesting fact about honey bees I learned in this book is that there is some suspicion the honey bees may have something to do with the decline of some native bee species. With limited resources available and limited habitat in places, I can see how that would be true, but it was not something about which I had given a lot of thought previous to reading this book. Studies have been looking to determine if foraging honey bees do so at the expense of native bees. However, with so few places void of honey bees, it has been difficult, if not impossible, to determine the extent to which this may be true.

"Where habitat is considered pristine, sensitive, unique or threatened, honey bee hives should be discouraged in order to avoid competition, disease transfer or pollination of invasive species," the authors wrote.

While it makes sense, again, it was something about which I had not previously thought. And, I assumed, if I had not thought about it through that lens, perhaps others had not, either. It would seem any bees would be good bees, but as has been proven time and time again, native bees are much better adapted to native plants and can be much more efficient pollinators in many cases.

A quick note or two about bumble bees before I sign off. One thing I did not expect to read (and others who know bees well might tell me I am silly for not knowing this) — queen bumble bees can control the gender of their offspring. Imagine that in the human world! Yikes.

If the queen fertilizes an egg, it becomes a female. If she does not fertilize an egg, it will be male. Most of her offspring, the book said, will be female. However, there will be a new generation of males for reproduction and a smaller number of new queens. This allows the genetics of those bees to carry on, which is the main objective, of course. Authors were not sure what exactly triggers the production of males and new queens, but it is likely spurred by several different factors.

Interesting fact two about bumble bees was about the new queens. New queens spend more time in the larval stage than worker bees. They grow larger and consume more food in that stage. New queens, they said, do not leave the nest as the males do. Males leave shortly after emergence to find a mate. New queens are fed by foraging workers, leaving the nest to only mate.

Once fall arrives, most of the bees die, including the old queen. Only the newly mated queens survive to hibernate through the winter. They dig down several inches below the ground, or into any leaf duff that may be on the ground nearby. When spring arrives, they will come out to create new colonies.

Is that not all just the bees knees? This information is just a very small, small portion of all the book has to offer, but the entire book is beyond the scope of just one column. I will bring more of the story as winter goes along and a gardener's dreams turn to spring. But I wanted to share some of the fun and interesting facts about bees I learned just in the first few chapters. The more we understand about a species, or a set of species, I suppose, I believe the more tolerant people are and the more they want to support those species. I think that can definitely be said for bees.

For those looking for a good read, or perhaps to make some plans for spring planting, check the book out. It can be found anywhere books are sold, for the most part, or directly from the Xerces Society. Their website is xerces.org.

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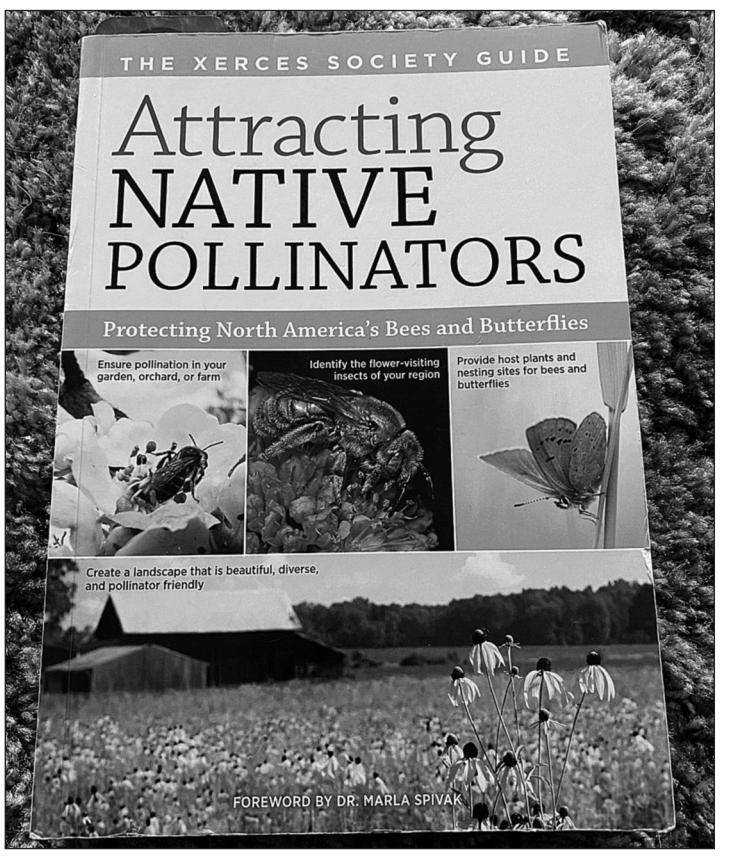


**BECKIE GASKILL**/LAKELAND TIMES

The Xerces Society Guide to Attracting Pollinators divulges many fun and surprising facts about the lives of bees and other pollinators.