



PHOTO CURTOESY OF THOMAS BILBO



Todd Anderson has received numerous awards and recognition for his work on environmental toxicology including Environmental Science Paper of the Year from Environmental Science and Technology. He has also received the Champion of Women Award from West Texas Association for Women in Science for mentoring women scientists.

TOXICITY AND ECOLOGICAL RISK

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Environmental contamination is an unfortunate side effect of the conveniences humans are accustomed to. Perfluorinated compounds, or PFCs, are an emerging environmental contaminant that is effecting innumerable sub-ecosystems. Drs. Todd Anderson and former TTU faculty member Chris Salice at The Institute of Environmental and Human Health at Texas Tech University, TIEHH, study the effects PFCs have on multiple aquatic species.

PFCs are ingredients in an assortment of devices such as cell phones, non-stick cookware, and computers. However, their most prominent use is historically in military grade fire retardant, generally used at most Air Force bases. They are persistent since, "they tend to associate with proteins. In some cases, PFCs may be accumulating in non-edible tissue," Dr. Anderson informs. In aquatic species, PFC sensitivity is apparent, however, exactly what effects they produce are limited.

Drs. Anderson, Salice, and their research team observed that PFCs interfered with the predatory cues in invertebrate prey. Predatory cues are either hereditary or learned behavior, and are classified as chemosensory cues or visual cues. By assessing the predatory cues researchers can measure the degree of contamination. Dr. Anderson

explains, “Species sensitivity distributions are useful for assessing the risk of PFC’s to aquatic organisms.” This specific sensitivity distribution focuses on PFCs as a chemical stressor and the potential long term ecological effects of the life history of several aquatic species. Conversely, measuring sensitivity to predatory cues is not the only measurement the team monitors. “Survival, growth, and reproduction endpoints tend to be the most useful in risk assessment,” Dr. Anderson clarifies. These endpoints provide more accurate measurement of how PFC’s may affect predator and prey.

By using water that is conditioned by Bluegill and Mosquitofish, the team focuses on the exposure pathway of PFC’s. “The sites where PFC contamination exists are largely controlled. The key there is to manage the risk by remediating the source of contamination,” Dr. Anderson stresses. PFC contamination remains a large concern, though the production of PFCs has decreased over the past decade. Remediation efforts are constantly thwarted due to the stability of PFC’s. Researchers are continuously working to discover a way to transform highly stable PFCs into compounds that are less harmful to the environment and can be broken down.

PFCs have diminished but they are still an environmental stressor to the ecosystem. Dr. Anderson’s goal is to provide other researchers the necessary tools to “address risk at other sites with PFC contamination.” Exposing prey to preconditioned water from Bluegill and Mosquitofish, allows him and his research team to document contamination effects and establish tolerable levels.