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Kimbra Cutlip (443) 482-2325 cutlipk@si.edu
Ryan King (254) 710-2150

New Study Reveals Strong Connection Between Land Use in the Chesapeake Bay Watershed and PCBs in White Perch

Twenty-five years after PCBs (polychlorinated biphenyls) were banned, these toxic agents, known to cause significant health problems in humans and animals, are still turning up in dangerous levels in fish caught in the Chesapeake Bay watershed. Surprisingly, it may not all be coming from high-suspect areas like Baltimore Harbor . According to a recent study by Smithsonian Environmental Research Center (SERC) scientists, areas where there is relatively little development are likely to have white perch with PCB levels above the recommendation for human consumption, particularly if the development is close to the shore.

Currently PCB consumption advisories are in effect for several fish species in less-industrialized areas of the Bay. The new study which will be published in the Dec. 15 issue of "Environmental Science and Technology" may shed light on the source of these PCBs and direct managers to identify areas of high probability for PCB contamination. The team, led by SERC scientist Ryan King, who is now an assistant professor at Baylor University , measured PCB levels in fish from 14 tributaries within the Chesapeake Bay watershed and correlated their findings with the amount, type and distribution of developed land in each location. Their findings indicate that higher levels of PCBs show up in white perch where development is most intense and closest to the shore.

"We found that the amount of development, particularly high density residential and commercial development, and the proximity of development to the watershed were incredibly strong predictors of contaminant levels in white perch tissue," said King.

In study sites with high levels of development, the researchers found that the farther the development was from the water, the lower the contaminant levels were in the fish they sampled. For example, the Back River watershed has a higher percentage of developed land than the Upper Patapsco River , however, the Patapsco has more development near the water. The study found more PCBs in perch caught in the Patapsco than in the Back. According to King, this trend was consistent even in watersheds with much lower levels of development.

Although PCBs have been banned since 1979, they remain in the environment for a very long time, and therefore it is not surprising to find reservoirs of them today. "The idea that there would be new active sources of PCBs is probably pretty unlikely," said King, "but PCBs take a very long time to degrade, and older areas of development may still be acting as non-point sources of these contaminants."

According to King, current patterns of development and land use tend to follow historical trends. So new development often occurs close to old development where PCBs are likely to be lingering in the

environment.

Efforts to identify waterways most likely to contain fish with high levels of PCBs have often focused on historical reservoirs or areas where PCBs were once manufactured, stored or discarded. But this new study highlights the need for further investigations into the sources of PCB contamination and the need to look at development patterns within the watershed to identify areas for testing.

On a broader front, King said the study also presents a very strong case for the importance of better understanding the impacts of development on the Bay. "Our study really points to the serious implications of development in the environment," he said. "It shows that there may be a lot of things going on in watersheds related to development, and it provides strong evidence that environmental and ecological conditions in subestuaries of the Bay are tied to land use in their associated watersheds."

The study was funded by the Environmental Protection Agency Science to Achieve Results (STAR) program and the Maryland Department of the Environment.

The Smithsonian Environmental Research Center is one of the nation's leading centers for environmental research and education at the land/water margin. A diverse staff of senior scientists engages in interdisciplinary studies that address issues such as global change, watershed studies, maintenance of productive fisheries, changes in our environment from biological invaders and understanding fragile wetlands and woodlands. In addition, SERC serves as a major center for educating the public and training the next generation of environmental scientists.

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back to press releases

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