

# THE FOX RIVER: LINKING POLLUTION AND CANCER

By Tyler Platz, CBEA Research Analyst

**T**he Fox River is an iconic landmark in Northeastern Wisconsin. It flows south to north through Lake Winnebago and into Green Bay, making it one of the most significant natural resources in the region. For over a century, post-industrial society has relied on the Fox River for power, water to use in various processes, and as a wastewater removal system. This relationship is the primary cause for one of the worst natural resources disasters in Wisconsin history.

Although it is a known fact that a combination of wastewater from paper mills and municipal wastewater systems polluted the Lower Fox River into its current dire state, how that pollution is affecting human beings is relatively unknown. Of all the pollutants in the Fox River, polychlorinated biphenyls (PCB's) have historically been of the greatest concern as they are known carcinogens. Bioaccumulation in fish and other forms of wildlife has created a toxic ecosystem from which humans are no longer able to obtain food. With such a potent cancer risk running through the backyards of Fox Valley residents, how are the humans in this area being affected? More specifically, are populations in the Lower Fox River region experiencing cancer at a higher rate than elsewhere in Wisconsin due to the PCB's present in the river?

After constructing a statistical model based on modern economic and oncological theory, data from the

Wisconsin Department of Health Services and Wisconsin Department of Natural Resources was run through a multiple regression. All the data was collected for the

previous year in 2012, so the model explained cancer incidence rates per 100,000 people reported in only 2012. The model output reported that the affected areas, namely Winnebago, Outagamie, and Brown Counties, experience statistically significantly more cancer cases than elsewhere in Wisconsin. The model held a set of factors constant so that only variation in cancer rates would be identified. These factors include age, ethnicity, sex, tobacco usage, infectious diseases correlated with cancer causation, access to healthcare, air pollution, and the number of concentrated animal feeding operations in a given county.

Given these statistical results, the interpretations are interesting as it they raise more questions than they answer. The model explained that populations in the affected counties experience higher cancer incidence rates holding the previously listed factors constant. That is to say, for example, cancer incidence rates in the affected counties are higher than they should be given their relatively young populations. The results imply that a factor common among the three affected counties is causing extraneous cancer cases above what would normally occur if that factor did not exist.

The model implied a common factor; however it did not directly implicate a single carcinogenic environmental factor. The obvious answer is the polluted Lower Fox River, as the affected counties were selected for the fact that they contain the river. The Fox River contains a variety of carcinogens, the most potent being

PCB's, and the primary means of cancer causation by PCB's is ingestion of contaminated wildlife. The results imply that a significant number of people in the affected area willingly consume contaminated wildlife. This is a plausible explanation, given that the annual Walleye run attracts many fishermen who undoubtedly consume at least a portion of their catch. Through this mechanism, the populations in the affected counties could experience the higher cancer rates reported by the model. Further statistical analysis ruled out groundwater contaminated by naturally occurring arsenic as a factor in the higher than normal cancer incidence rates. The final result implies, through ruling out all other relevant factors, that the carcinogens present in the Fox River are contributing to abnormally high cancer rates in Brown, Outagamie, and Winnebago Counties likely via fish consumption.

It must be noted that there are provisions in place to control for the consumption of contaminated wildlife. The Wisconsin Department of Natural Resources has posted fish advisory signs along the length of the river as well as online. These advisories recommend amounts of contaminated fish which may be consumed, which varies by demographic, as to reduce the likelihood of cancer causation by PCB ingestion. In addition, the paper mills and municipalities implicated by the United States federal government in the polluting of the river have contributed monetarily to the cleanup of sediments, a process set to reach completion in 2017. Although this cleanup will not reduce PCB levels in fish populations immediately, over a period of time the severity of contamination should fall.

While this study was novel in finding a strong, plausible link between the contaminants present in the Lower Fox River and abnormal cancer rates in the surrounding population, the topic must be analyzed further. Statistical analysis must be conducted in order to more accurately define which populations are affected and which are not. In addition, biological research should investigate bioaccumulated levels of PCB's in human beings in an effort to indicate the effectiveness of fish advisories. The fish advisories themselves should likely be analyzed to ensure clarity, simplicity, and understandability by individuals from a range of linguistic backgrounds.

Although this study was preliminary in researching cancer incidence as it relates to carcinogens in the Fox River, its results should be considered by public health officials, policy makers, and individuals who interact with the river. Human actions in a fragile ecosystem cannot be undone and have profound effects for all living creatures now and in the future. Whether we wish to utilize nature for industry or perfectly preserve it for future generations, we must realize that in our symbiotic relationship with the environment is the health of our friends, neighbors, and families.

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