

Environmental P R O T E C T I O N

Study Links Industrial Contaminants to Shenandoah Fish Kills

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Severe fish kill events in the Shenandoah River have been documented since 2004, but their cause has been difficult to uncover. Now, a new study using proteomics analysis has found particular impacts on fish immune systems, suggesting they are affected by long-term exposure to sublethal toxic substances.

Proteomics is the study of proteins expressed by a specific genome.

Current environmental stressors include eutrophication, increasing temperature, and chemical contamination, and this watershed hosts many industries, such as rayon producers, turkey farms, and pharmaceutical manufacturers, which dispense at least 23 significant types of industrial contaminants.

In a four-month period in 2005, researchers observed an 80 percent mortality of adult smallmouth bass and redbreast sunfish.

Immunoglobulin proteins, which provide evidence of previous immune system challenges from sources such as bacteria and parasites, are elevated in all areas of the river tested (main stem, North Fork, and South Fork), and higher leucocyte numbers in the main stem and North Fork indicate either more vigorous immune systems or a response to greater immune system challenges. Judging by visible lesions and previous fish kill events, the latter is more likely. Fish from South Fork show many of the same

results as fish from the other two areas, but they also show a complete absence of p40phox, which assists in respiratory burst responses and ultimately in cell metabolism and antioxidant defenses.

The combination of proteins that have been enhanced or suppressed suggests certain culprits, including arsenic exposure resulting from the poultry industry and fertilizer/herbicides from agricultural applications.

The study appears in *Environmental Toxicology and Chemistry*. For the full text, visit <http://www.allenpress.com/pdf/ENTC27.8-8618-27-8-1756.pdf>

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