PURDUE

ANIMAL ISSUES

Briefing

E. coli in Surface and Ground Water

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Knowledge to Go

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Situation

• Indiana has 36,000 miles of rivers, 106,000 acres of lakes, and 43 miles of Lake Michigan shoreline. According to the latest survey by the Indiana Department of Environmental Management (IDEM), 81% of our water bodies do not meet water quality standards for recreation (swimming) due to *E. coli*.

• Failure to meet water quality standards is a particular concern where water is used for drinking (for example, most private wells and non-chlorinated public wells), but health concerns often arise where lakes or streams are used for swimming. Water-based recreation is an important economic component for many Indiana counties.

• Bacteria, including *E. coli*, are the most common drinking water contaminant found in public and private water systems, although contamination usually reflects well conditions rather than generalized ground water contamination.

What We Know

• *E. coli* are present in the feces of all warm-blooded animals. (Feces can contain about 400 million *E. coli* per gram.) Therefore, contamination from human or animal sources is indicated by the presence of the bacteria.

• Most *E. coli* are harmless. Monitoring for the harmless *E. coli* is done because their presence serves as an indicator for the existence of harmful bacteria, viruses, and protozoa which can cause illness.

• Much recent attention has been focused on one *E. coli* known as O157:H7, which is very harmful because it can produce a toxin when growing in the intestine. This toxin can cause hemorrhaging and death.

• *E. coli* from human or animal feces can reach water from many sources. Combined sewer overflows contribute to bacteria contamination in rivers throughout the state. Improperly functioning septic systems allow bacteria to avoid treatment. Animal feedlots and land application of manure that are not managed well can contribute to surface and ground water pollution. Flocks of migrating birds and other wildlife that share our water supply are also sources of bacteria.

What We Don't Know

• We do not know what the major sources of *E. coli* for Indiana water are, although we know that septic systems, combined sewer overflows, and livestock systems all contribute.

• We do not know how many people if any have gotten ill from swimming in contaminated water, but we do know that the presence of *E. coli* indicates the potential for more harmful fecal organisms in the water.

• We do not know the typical survival time of *E. coli* in Indiana waters; some data suggest a survival time between 10-30 days in river water. We also don't know how well O157:H7 survives in the environment or the frequency with which it is encountered.

• We do not know the accuracy of a generation of new tests that may be capable of distinguishing animal from human sources of bacteria.

• We do not know how many Indiana septic systems are in failure and what it would take to correct them.

• We do not know the precise effect of various manure management practices such as incorporation, buffer strips, etc. We also do not know how significant movement of bacteria through tile-lines is.

• We do not know how well treatment systems such as composting, bioreactors, or wetlands reduce numbers of *E. coli* under Indiana conditions.

What We're Doing

• We are developing materials and presentations to educate the public about *E. coli.*

• We are working with farmers to develop better manure management practices that reduce the potential for bacteria to reach ground and surface waters.

• We are studying the impacts of urban runoff on water quality and the effects of a constructed wetland on the fate of bacteria.

• We are evaluating the water quality found in tile-line discharge, and these studies could potentially include a microbial component.

• We are attempting to evaluate the contributions of failing septic systems to *E. coli* contamination, but we lack personnel.