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### Local

## Research to determine if bacteria is from gulls

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RACINE - People have blamed gulls since the first hints of water quality problems surfaced at Lake Michigan beaches, but no proof has replaced those suspicions - until now.

Research this summer is likely to tell scientists whether Racine's gull population poses a real risk to human health. To zero in on the answer, scientists are looking at the sources of bacteria in the water and whether those bacteria really represent a risk.

Two main grants are funding this summer's research, said Julie Kinzelman, microbiologist for the Racine Health Department. One is from the SC Johnson Fund, and the other is from the National Institutes of Health.

The Johnson grant will pay for researchers to take a slew of water samples from near shore waters and map where the concentrations of *E. coli* are found, Kinzelman said. Previously city researchers have found greater concentrations of *E. coli* on the sand and along the shore, she said. "But we want to know is if there's anything we're missing because we still have days when, say, the (English Street) outfall's not running when it's raining, or when there's not high waves to transport bacteria from sand." Past research has hinted that high bacteria concentrations along the lake shore may be the result of waves washing organisms from the beach sand into the water.

Sandra McLellan, assistant scientist at the Water Institute run by the University of Wisconsin-Milwaukee and a research partner with the Racine Health Department, has a similar mapping project under way this summer. She'll be investigating why bacteria counts in Milwaukee's rivers and inner harbor can be several thousand times above acceptable limits even after days without enough rain to make sewage plants overflow. "So when there's a sewage overflow, we know there's sanitary contamination there, and we can characterize that and see what that looks like. But when there's no sewage overflow, there is this significant load of *E. coli* coming down the rivers from storm water."

Another facet of this work will be using a simple idea to figure out the sources of bacteria.

For several years, McLellan has been trying to assemble a library of DNA fingerprints for different types of *E. coli* with the intention of being able to match a particular type of the bacteria to its host - a human, a dog or a gull. "What we have found out with *E. coli* is it's so diverse that it's really not feasible to go out and characterize all these different sources." You'd have to do raccoons, squirrels,

birds, gulls, cows, and everything else, she said.

McLellan's research is now focusing on a simpler idea: antibiotic resistance. The hypothesis, McLellan said, is that people's intestines contain bacteria resistant to the antibiotics commonly used to treat human illness. So if researchers grow bacteria from a water sample and find that most are not resistant to nine common antibiotics, the conclusion would be that those bacteria came from a wild animal, such as a gull. Resistant bacteria would be most likely to have come from a human, or perhaps some domestic animal that was given antibiotics. Future research will focus on distinguishing between bacteria from humans or domestic animals.

"In reality, I think we're going to see mixtures of contamination, but that's informative, too," McLellan said.

"The Johnson grant," Kinzelman said, "at its completion, should allow us to answer the question: Where is *E. coli* getting into the system, and is it most likely human or animal? And the NIH grant is a partner grant. We'll be able to take it one step further and say, if it's animal, is there risk to humans?" When health workers measure the concentration of bacteria, they look for one called *E. coli* because its presence usually indicates that other organisms are also in the water, organisms that cause disease in humans.

"But what if we find out, in fact, that the *E. coli* is not coming from people the majority of the time, it's coming from seagulls? Do seagulls carry human pathogens frequently enough that it could potentially make people sick?" Kinzelman said. No one, in other words, has ever really looked at bird droppings to see whether human pathogens are there.

So researchers this summer will be taking samples of gull feces to find out whether the birds carry such microorganisms as giardia and salmonella that are dangerous to humans. Then laboratories, including the health departments in Racine and Milwaukee, will test for those pathogens.

No one is forgetting those ubiquitous geese, but gulls are a better bet if you're looking for human pathogens, McLellan said, because they eat trash. Their droppings have a thousand times more *E. coli* than goose droppings. "That's 340 million *E. coli* per gram of gull feces."

All these answers and potential answers, are the result of investment, but not by local citizens. Over the years, Racine has attracted about a quarter-million dollars in grant money for beach contamination research, Kinzelman said. "We don't use a penny of taxpayer money."

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