

Update: DHEC Bacterial Indicator Change

By Andy Miller

DHEC is currently in the process of drafting language to change the bacterial indicator South Carolina uses to monitor the quality of surface fresh waters of the State. The indicator change is meant to protect for primary contact recreational uses such as swimming.

Swimming in water contaminated with human and/or animal waste may make swimmers sick. The most common illnesses are gastroenteritis and upper respiratory tract infections. There are several pathogens, both viral and bacterial, that are potentially responsible for these illnesses. Since it is impractical to routinely test waters for multiple pathogens, considerable research has been undertaken to identify factors associated with this risk that can be reliably monitored quickly and inexpensively.

Much of this research has focused on the identification of easily differentiated classes of bacteria that are common in sanitary waste. Waters contaminated with sanitary waste could be predicted to be associated with increased risk of disease transmission to swimmers. Epidemiological studies have, in fact, established these links between bacterial indicator concentrations and the incidence of certain illnesses among swimmers.

The current indicator, fecal coliform bacteria, has been used in South Carolina and other states for many years. However, more recent epidemiological analysis has prompted EPA to recommend that states consider adopting either *E. Coli* or *Enterococcus* bacteria. These types of bacteria have been demonstrated as being superior to fecal coliform in predicting the risk of swimming related illness, specifically gastroenteritis.

To evaluate the suitability of each of these potential indicators DHEC undertook a statewide sampling study. The intent of this study was to:

- Identify the most heavily used swimming areas in our state.
- Focus limited resources on providing a higher level of protection for these frequently used swimming areas.
- Determine reasonable protection for areas infrequently used for swimming.
- Assess the degree to which each of the proposed indicators correlates quantitatively with the current fecal coliform indicator.

The study consisted of weekly sampling, from January 5, 2009 through December 30, 2009, for three pathogen indicators: fecal coliform, *Escherichia coli*, and *Enterococcus* at 73 locations. There were a total of 10,922 analyses conducted of which: 3,717 were for fecal coliform bacteria, 3,602 for *Escherichia coli*, and 3,603 for *Enterococcus*.

Statistical analysis of the data indicated that *E. coli* showed a better correlation to fecal coliform than *Enterococcus* in fresh waters. An advantage of *E. coli* vs both fecal coliform and *Enterococcus* is its more exclusive association with mammalian enteric waste. Among the other states that have switched their freshwater standards from fecal coliform to one of the other EPA suggested indicators, a distinct majority has chosen *E. coli* in preference to *Enterococcus*. Additionally *E. coli* can take advantage of a less expensive analytical method, and the public is familiar with *E. coli* as a health concern.

Considering these advantages, *E. coli* has been proposed as the preferable indicator bacteria to use for South Carolina's freshwater primary contact recreational use standard. Using EPA guidelines and data gained from the 2009 study, the department has reviewed several options for revised indicator concentration criteria to support the standard. The epidemiological basis for these concentrations assumes a risk of 8 illnesses per 1000 swimmers. This is the same risk level used for the current fecal coliform standard.

To begin this proposed change to the bacteria standards, a Notice of Drafting was announced in April 2011. As a part of the process, considerable input has been gained from several stakeholder meetings held during the spring and summer of 2011. These well-attended meetings have included a broad spectrum of knowledgeable stakeholders who have provided constructive comments and suggestions to guide decision-making. This change to State regulations R.61-68 and R. 61-69 will require legislative approval.

Adopting *E. coli* as South Carolina's indicator organism for the primary contact recreational use standard will provide for a more scientifically defensible benchmark for the protection of public health for those who enjoy recreating in South Carolina's freshwater rivers, streams and lakes. Comments and suggestions by stakeholders have been useful in drafting the standard to date, and are welcome going forward. For more information contact: Gina Kirkland 803-898-4330, Standards Coordinator SCDHEC, or go to: http://www.scdhec.gov/environment/water/wq_standard.htm.