**Richard A. Haugland, Research Microbiologist, in EPA's National Exposure Research Laboratory**

Exposure Methods and Measurements Division
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**Area of Expertise:** Expertise is in the development and application of nucleic acid-based analytical methods for monitoring microorganisms in indoor environments and recreational and drinking water. Most recent work has contributed to the determination of relationships between fecal indicator bacteria densities in recreational waters, as determined by a rapid quantitative polymerase chain reaction (qPCR) method, and risk of swimming-related illness. These relationships have been used by the U.S. EPA, Office of Water to recommend new qPCR-based water quality criteria guidelines for recreational waters. Current work is on providing assistance to the Office of Water in developing qPCR technology implementation guidance to States. Future work is anticipated to provide additional data for development and assessment of Quantitative Microbial Risk Assessment (QMRA) models.

**Select Publications:**

Converse, R.R., Kinzelman, J.L., Sams, E.A., Hudgens, E., Dufour, A.P., Ryu, H., Santo-Domingo, J.W., Kelty, C., Shanks, O.C., Siefring, S.C., Haugland, R.A., Wade, T.J. 2012. Dramatic Improvements in Beach Water Quality Following Gull Removal. Env. Sci Technol. 46(18):10206-13.

Haugland, R.A., Siefring, S., Lavender, J., Varma, M. 2012. Influences of sample interference and interference controls on quantification of enterococci fecal indicator bacteria in surface water by the qPCR method. [EXIT] Water Research, 46(18):5989–6001.

Cao, Y., Griffith, J.F., Weisberg, S.B., Sivaganesan, M., Haugland, R.A., Kinzelman, J., Blackwood, A.D., Noble, R.T. 2013. Effect of platform, reference material, and quantification model on enumeration of general fecal indicators by quantitative PCR methods. [EXIT] Water Research, 47(1):233-241.

Shanks O.C., Peed L., Sivaganesan M., Haugland R.A., Chern E.C. 2014. Human fecal source identification with real-time quantitative PCR. Methods Mol. Biol.1096:85-99. doi: 10.1007/978-1-62703-712-9_7.

Chern, E.C., Brenner, K., Wymer, L., Haugland, R.A. 2014. Influence of wastewater disinfection on densities of culturable fecal indicator bacteria and genetic markers. J. Water and Health 12.3: 410-417. doi:10.2166/wh.2013.179.

Green, H.C., Haugland, R.A., Varma, M., Millen, H.T., Borchardt, M.A., Field, K.G., Walters, W.A., Knight, R., Kelty, C.A., Shanks, O.C. 2014. Improved HF183 quantitative real-time PCR assay for characterization of human fecal pollution in ambient surface water samples. Appl. Environ. Microbiol. 80(10): 3086-3094. doi: 10.1128/AEM.04137-13.

View more research publications by Richard Haugland.

**Education:**

- Ph.D. Developmental Biology, 1978
- B.S. Biology, Muskingum College, 1973

**Professional Experience:**

- Research Microbiologist, USEPA, ORD, NERL-MCEARD, Cincinnati, OH, 1991 – present
- Research Assistant, University of Cincinnati, 1989 – 1991
- Research Associate, University of Illinois at Chicago, 1986 – 1989.
- Research Molecular Biologist, Allied Corporation, Syracuse, NY, 1983 – 1986.
- Research Associate, Oregon State University, 1982 – 1983