United States Environmental Protection Agency

Office of Water
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2017 Five-Year Review of the 2012 Recreational Water Quality Criteria

Summary

The EPA has completed a five-year review of its 2012 Recreational Water Quality Criteria (RWQC) as required by BEACH Act amendments to the Clean Water Act (CWA) Section 304(a)(9)(B). An important goal of this review and report is to document the assessment of whether revisions to the 2012 RWQC are necessary. The focus of the review was the science related to the protection of human health in waters designated for primary contact recreation (e.g., swimming, wading, surfing). On the basis of the review described in the review report, the EPA has decided not to revise the 2012 Recreational Water Criteria during this review cycle. The Agency believes, however, that further research and analysis as identified in the report will contribute to the EPA's future review of the 2012 RWQC.

Background

The 2012 RWQC replaced the 1986 bacteria criteria, which relied on a series of epidemiological studies that the EPA conducted in the late 1970s and early 1980s to derive protective values for culturable indicators of fecal contamination and illness in swimmers (*E. coli*, enterococci, and other fecal indicators such as fecal coliforms).

The 2012 RWQC were based on the latest research and science including new epidemiology studies conducted in the 2000s yielding revised values for *E. coli* and enterococci designed to protect the public from exposure to harmful levels of pathogens while participating in water-contact activities in coastal and non-coastal recreational waters.

In addition to providing explicit duration and frequency components, the 2012 RWQC offer two sets of numeric concentration thresholds corresponding to two estimated illness rates, either of which would protect human health.

New in the 2012 RWQC document were: 1) values that protect public health similarly in both marine and fresh waters; 2) use of two metrics to better define the magnitude of the criteria (geometric mean, or GM, and a statistical threshold value, or STV); 3) a new tool for use in notification programs (Beach Action Value, or BAV); 4) a single level of criteria rather than different values based on use intensity; and 5) more tools for assessing and managing recreational waters, including the more rapid qPCR technique for enterococcus (EPA Method 1611), and use of qPCR on a site-specific basis for monitoring. For a more complete description of the 2012 RWQC, see: https://www.epa.gov/sites/production/files/2015-10/documents/rec-factsheet-2012.pdf.

Advances since release of the 2012 RWQC

This review describes much of the new science since the time the EPA developed the 2012 RWQC. These scientific developments are in the following areas: health studies, methods, microbial source tracking, coliphage criteria, antibiotic resistance, cyanotoxin criteria/swimming advisories, RWQC implementation tools, and criteria adoption.

Conclusions from the Review

Need for Revision of the 2012 RWQC: On the basis of the review described in the report, the Agency has decided not to revise the 2012 Recreational Water Criteria during this review cycle. The Agency believes, however, that further research and analysis as identified in this Report will contribute to the

EPA's future review of the 2012 RWQC. The EPA will work with the environmental public health community as it moves forward with its research efforts. The use of qPCR and ongoing research in methods and indicators continue to strengthen and augment the tools available to support the current criteria.

Health Studies and Performance of qPCR Methods: Findings of health studies published since the development of the RWQC are generally consistent with the findings of studies that formed the basis for the 2012 RWQC, and enhance the depth and strength of the evidence underlying the RWQC. Health studies show that *Enterococcus* spp. measured by qPCR, is more predictive of GI illness and results are more timely than current bacterial indicators measured by culture methods.

Protection of Children: A growing body of evidence suggests that children can be disproportionately susceptible to health effects of pathogen exposure. There are opportunities for further resolution of epidemiological relationships, especially in the area of children's health protection.

Microbial Source Tracking (MST): Since 2012, there has been significant progress toward the implementation of human source identification technologies. Accurate and reliable MST technologies could dramatically improve water quality management in the United States by allowing the development of alternative site-specific criteria and identifying opportunities for source remediation. Alternative water quality metrics, such as human markers, may also be helpful to inform risk levels in wet weather conditions.

Antimicrobial Resistant Bacteria/Genes (AMRB/ARG): There is an increasing body of literature available on the environmental occurrence of AMRB/ARG in recreational waters. However, to develop a more complete picture, additional research is needed on the incidence, associated risks, and transfer mechanisms in recreational waters, as well on the removal of AMRB/ARG by wastewater treatment processes. The EPA is in the early stages of developing a broader surveillance strategy and looking for meaningful opportunities to improve human health related to exposures to AMRB/ARGs.

Coliphage as an indicator: Risk assessments, epidemiological studies, and outbreak data indicate that viruses cause most illnesses associated with recreational waters impacted by human sources. The EPA is exploring the development of recreational criteria for such a viral indicator to augment the bacterial indicators in the 2012 RWQC and advance public health protection in recreational waters.

Implementation Tools: In this review the EPA identified new sanitary survey tools, refinements of predictive models such as EPA's Virtual Beach, and process models for remediation and for use in Quantitative Microbial Rick Assessments (QMRA).

Cyanotoxins in Recreational Waters: Recreators can be exposed to cyanotoxins in ambient recreational waters leading to increased health risks. Since the 2012 RWQC, the EPA has published draft recreational criteria and/or swimming advisories for the cyanotoxins microcystins and cylindrospermopsin. These values and related technical information and support materials provide additional tools to protect public health in recreational waters.

Next steps

In this review, the EPA has identified the priorities for further work to utilize this new information so that improvements to public health protection in recreational waters continue. The Agency is in the process of developing a plan to implement those actions to build on the progress made over the past five years and reduce barriers to criteria adoption. Further research and analysis as identified in this Report will contribute to the EPA's future review of the 2012 RWQC.

Where can I find more information?

The report on the *2017 Five-Year Review of the 2012 RWQC* and the 2012 RWQC Document are available at: https://www.epa.gov/wqc/2012-recreational-water-quality-criteria.

Additional information on recreational waters and beach monitoring is available at: https://www.epa.gov/beaches.