

NATIONAL WATER REUSE ACTION PLAN

COMPLETED ACTION



Action 5.2 Identify Water Quality Monitoring Practices for Reuse Applications

Background

Water quality at water reuse facilities is monitored through a combination of individual, surrogate and/or bulk parameters, and there are many new monitoring tools being developed to assess water quality in water reuse schemes. When mature, these tools may enable utilities to improve operations and detect potential hazards with improved sensitivity and in a timelier manner than currently possible with traditional methods.

These new monitoring tools and techniques may require refinement and validation in demonstration and/or full-scale facilities before they can be used. Studies should be carefully designed, and the data should be systematically evaluated, to minimize the risk of misinterpretation. This action helped improve understanding of the applicability of these monitoring tools and how to use and interpret them.

Action Team

Action Leaders

- **Water Research Foundation (WRF)**
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Action Partners

- **California State Water Resources Control Board (SWRCB)**
- **Southern California Coastal Water Research Project (SCCWRP)**
- **U.S. Environmental Protection Agency (EPA)**

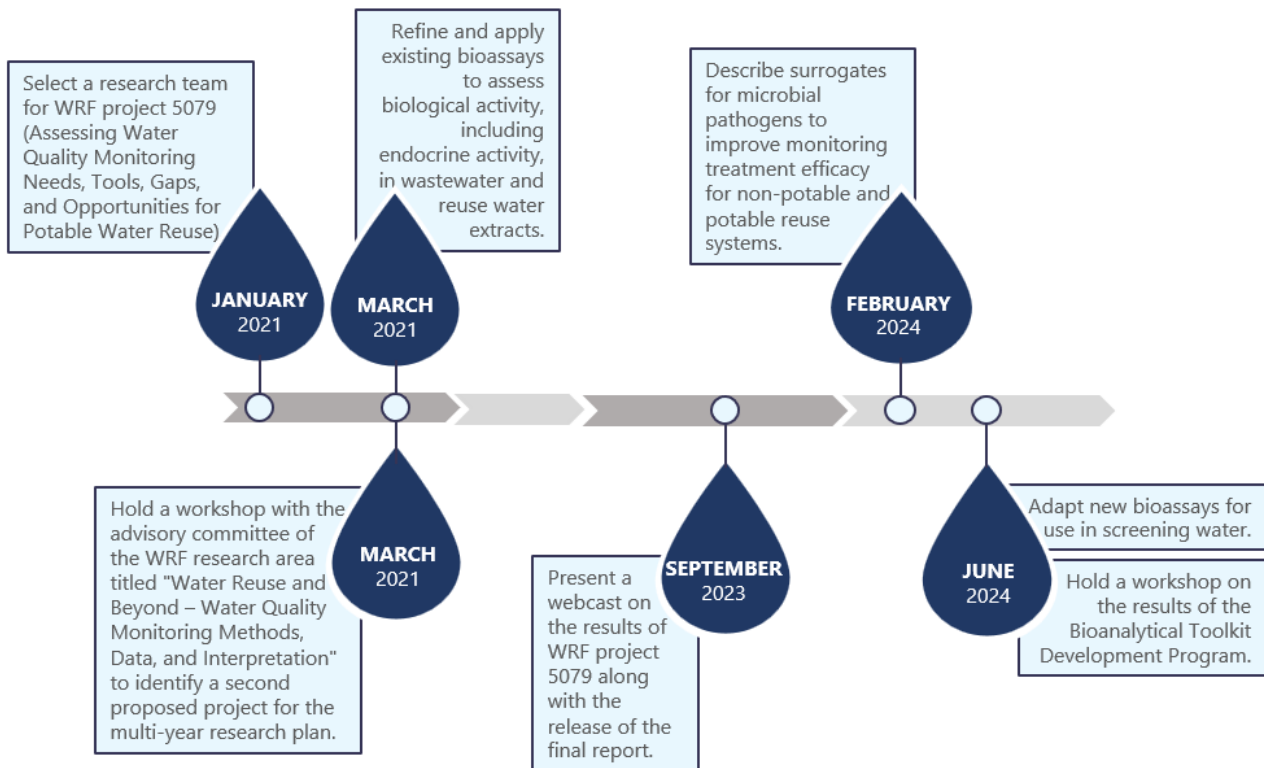
Accomplishments/Impact

- Published a [journal article](#), “*In vitro* effects-based method and water quality screening model for use in pre- and post- distribution treated waters.” The article provides a water quality screening model to allow water quality managers to collect necessary drinking water samples.
- Completed [WRF Project 5079: Assessing Water Quality Monitoring Needs, Tools, Gaps, and Opportunities for Potable Water Reuse](#). The goal of this project was to prepare a database of current and promising water reuse technologies to help identify future technological needs, select appropriate water quality treatment and monitoring tools and to understand the information the tools provide.
- Published a [journal article](#), “Evaluating endogenous viral targets as potential treatment monitoring surrogates for onsite non-potable water reuse,” to improve monitoring treatment efficacy for non-potable and potable reuse systems by assessing surrogates for different viral classes.
- Hosted a [technical workshop](#) among cell bioassay experts and water treatment utilities. The goal was to discuss developmental advances and real-life applications of *in vitro* bioassays for water quality assessment, including laboratory procedures, data analysis workflow and data interpretation frameworks.
- Completed SWRCB project D1905006: Develop and Standardize Bioanalytical Screening Tools. As part of this project, SCCWRP published a two-part technical report describing the optimization results and standardized practices for three *in vitro* bioassays that can be applied to screen different aquatic matrices. The technical report includes “[Part I – Final Report](#)” and “[Part II – Protocols for Laboratory and Data Analysis](#).”

Lessons Learned

- Effective communication between utilities, technology manufacturers/vendors, and consultants is essential for (1) preventing and overcoming issues encountered when implementing online sensor technologies and (2) increasing the reliability of online sensors during water reuse treatment.
- No sensors exist, nor are likely to emerge in the near future, that can detect the presence of microorganisms at health-relevant concentrations in near-real time for drinking water and potable reuse facilities. This technological gap highlights the importance of process and surrogate monitoring approaches like hazard analysis and critical control point methodologies.
- Utilities prioritize reliability and operability when selecting appropriate monitoring technologies. Sensor maintenance requirements and reliability are a major barrier to adopting new technologies due to the heightened labor and staffing demands.

Action Implementation Process



Potential Future Activity

- Further development of online sensor technologies and/or the expansion of surrogate parameters are needed to shift away from time-consuming laboratory analyses.
- Additional research and testing of the emerging technologies outlined in [WRF Project 5079](#) are required to develop these as future monitoring solutions.



Additional Resources

- [WRF Project 4508: Assessment of Techniques to Evaluate Water Quality from Direct and Indirect Potable Reuse Facilities](#) (2019)
- [WRF Project 1688: Monitoring for Reliability and Process Control of Potable Reuse Applications](#) (2016)
- [California SWRCB: Water Quality Control Policy for Recycled Water](#) (2018)
- [EPA Office of Research and Development: Alternative Water Sources Research](#)