

Water Environment Research Foundation (WERF)

Request for Proposals (RFP)

Proposals must be received by October 8, 2008

Informing the Risk-Based Framework for Recreational Waters: Quantification of Microbial Pathogens and Indicators from Various Sources

RFP PATH1R08

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Research Objectives

WERF has worked with its subscribers to identify and prioritize their top research challenges and has established a flexible, adaptive relationship with researcher/teams to develop, describe, and deliver timely and cost-effective applied research and communication strategies.

This RFP addresses one component of WERF's "Waterborne Microbes and Public Health" research challenge. It describes the overall objectives and suggests some key milestones to focus this research effort.

The objectives of the research effort solicited by this RFP are the following:

- Identify and fill data gaps pertaining to loadings and concentrations of waterborne pathogens and indicators from various sources. Provide these data across a wide range of recreational waters including marine, estuarine and freshwater.
- Compile, analyze and incorporate the data in quantitative microbial risk assessment (QMRA) models and waterborne risk management frameworks.

The outputs from this research should include: 1) information regarding the relative contribution and risk attributable to the various sources of waterborne pathogens that can be used by managers to prioritize source control and treatment programs, and 2) information that serves as a sound scientific foundation to support efforts in the next 2 years to revise current health-based recreational ambient water quality criteria under the Clean Water Act.

This RFP allows for and encourages the participation of a diverse research team whose members may change over time, depending upon the expertise needed to conduct particular components of the research plan. It is expected that proposers will describe specific elements, milestones, resources, and schedule in the form of a research plan that will meet the objectives of this research effort. WERF staff will work with the selected project team to negotiate the appropriate deliverables, funding, and overall timeline for the research aspects of the program.

The scope of this effort will also include the development and implementation of a specific communication plan for knowledge transfer. The communications plan must articulate the intended outcome of the research, identify the target audience(s), and detail the communications

products and venues. The communications plan must be integrated into the overall project timeline, with designated responsibilities. Additionally, the project must designate a “communications liaison” prior to contract approval.

Proposers need to have demonstrated proficiency regarding the key issues that pertain to this research challenge and must have the desire and ability to formulate an approach that involves identifying and managing an appropriate team of experts. Proposers also are expected to seek collaborations and leveraging opportunities to accomplish this work (i.e., from the outset and also as work progresses).

During the contract period, the selected research team will present its plan, its progress and its interim and final deliverables to WERF’s program director and to the wastewater microbes and human health Issue Area Team (IAT). They will provide ongoing input and review of the program. Additionally, the WERF communications director will review and approve communication deliverables. The IAT is a volunteer advisory group that includes academics, utilities, U.S. Environmental Protection Agency (EPA), and non-governmental organization representatives. WERF will provide funding on a milestone/task order basis.

Proposals for this research effort should be prepared and submitted to WERF in accordance with the specified instructions (see below). Proposals will be reviewed and rated against a number of selection criteria (see below).

It is important for proposers to note that WERF considers this process to be a competition of team qualifications as well as a competition of the best approach for achieving the goals and desired outcomes of this research effort. Resourcefulness, flexibility, and practicality are encouraged. WERF’s goal is to have the selected project team under contract in January of 2009.

Background of this Challenge and Research Effort

WERF seeks expert assistance in understanding and addressing critical short- and longer-term research needs with respect to wastewater- and stormwater-borne microbes, risk assessment, and public health, especially as such research pertains to the science behind EPA’s current recreational water quality criteria and the pending criteria update.

In the past year, EPA has been working to determine what research and other activities will be needed to develop the information and insights necessary for the revision or development of new recreational water quality criteria for pathogens and indicators (as part of legislated requirements under the BEACH Act). The principle focus of EPA’s criteria update program is on the protection of human health at public swimming areas in coastal waters of the United States, but EPA also wants the revised/new criteria and methods to be applicable for other Clean Water Act purposes and in different types of water bodies.

WERF subscribers want to ensure that there are strong correlations between the pathogen(s) and indicator(s) that EPA chooses, and that methods for detecting, isolating, characterizing and quantifying pathogen(s) and indicator(s) make sense when applied to different Clean Water Act applications. In addition, the research will provide WERF subscribers with risk assessment and other tools for use in management decisions regarding public health.

Rationale for Conducting the Research Effort at this Time

Water quality criteria for bacteria are commonly used by regulatory agencies to establish baselines for supporting designated uses. Such criteria also tend to drive decisions that underlie regulatory policies, priorities, and requirements that pertain to wastewater and stormwater management programs. Having accurate, quantitative information and robust data sets to support the development of appropriate criteria is important to WERF subscribers and their ratepayers. It has been over 20 years since the current recreational water quality criteria was published. In the interim there have been substantial advances in the science. In 2007, EPA held a workshop that brought together 43 experts to describe the state of knowledge, identify gaps in the science, and prioritize the research needed to support development of new or revised water quality criteria by 2012. Using this information, EPA has developed and is pursuing a science plan to develop improved methods for detecting and quantifying indicator organisms and pathogens for human health, especially in coastal waters.

WERF's wastewater microbes and human health IAT has developed a complimentary plan to address those gaps that are of particular importance to WERF subscribers (which include operators and owners of wastewater collection and treatment systems, and stormwater collection and treatment systems), many of whom operate in freshwater and estuarine environments. This RFP was developed to fill in some of these gaps and also to provide EPA with timely and useful information that can be used in the process of revising and updating ambient water quality criteria for recreational waters.

Several investigative approaches, including epidemiologic studies and quantitative microbial risk assessment, are called for in the report from EPA's Experts' Scientific Workshop and are also cited in EPA's [Critical Path Science Plan](#). Such approaches are expected to be implemented by EPA as the agency moves forward with its plans.

There are still data and knowledge gaps in the science, partly because of the huge variety of environmental, climate, watershed, and receiving water conditions that need to be understood and taken into account. Epidemiological studies (alone) will not be able to answer a number of the outstanding questions due to cost constraints (and general limitations related to the technology and uncertainty of epidemiological approaches). In situations where epidemiological studies would be too expensive, too complex, or otherwise inappropriate, the use of microbial risk assessment and modeling can help in evaluating and managing risks. However, there is presently a shortage of credible, quantitative data describing possible correlations between the prevalence and concentrations of pathogens and indicators of pathogens from various sources in the environment. The research effort sought by this RFP would supplement available data and related information by quantifying the loads of microbial pathogens and indicators (e.g., enteric adenoviruses, *Cryptosporidium*, *E. coli*) in a variety of sources, such as CSOs, SSOs, sanitary sewage bypasses, treated effluents from POTWs, septic and small wastewater systems, municipal stormwater system discharges, agricultural practices, and domestic animals and wildlife (terrestrial, aquatic, and avian). These are the "sources" of pathogens and indicators referred to throughout the document.

Research Approach - Overview

The purpose of this research effort is to identify and fill existing data gaps in the science and understanding of risks from waterborne pathogens, and to provide inputs to QMRA, modeling, and waterborne risk management frameworks for the prioritization of source control and treatment programs.

This research effort will entail the collection of new data, as well as review and interpretation of existing data and other information regarding the concentrations and overall loads of waterborne pathogens and indicator organisms contributed from a variety of sources. WERF intends the scope to include consideration of the ecology of these pathogens and indicator organisms in different climatic zones and in both marine and freshwater aquatic systems. Pertinent information should be sought from regional, national, and international data sources. The desired outcome is to obtain information that can be used to rank the sources of fecal contamination (based upon risk to human health) and hence improve the accuracy and reliability of risk assessment models that are used to support risk management decisions.

The research effort sought by this RFP is expected to consist of two principal phases (referred to below as Phases 1 and 2), with communications activities and products incorporated as appropriate. A third demonstration phase, outside the scope of this RFP, may occur in the future. Close coordination with WERF would be necessary throughout all phases.

Phase 1 – to identify and fill data gaps pertaining to waterborne pathogens and indicators

- Compile information on what is known at present regarding waterborne pathogen concentrations and loads contributed from various sources and compare this to loads from relatively undeveloped watersheds. Focus on determining and describing the amount of data and other information that are available (and credible). Include information regarding pathogen (bacteria, viruses, protozoa, and parasites) and indicator organism fate, transport, and survival; detection and characterization methods; and associated limitations. Ensure that data are obtained from regional, national, and international sources.
- Statistically summarize (e.g., geometric mean, variances) the types, concentrations, and loadings of waterborne pathogens and indicators from the different sources of water contamination.
- Develop a plan that targets data collection to source types and geographic areas where (a) the gaps are greatest and/or (b) where the supplementation of existing databases will provide the most valuable information.
- Conduct field sampling and lab analyses to obtain information regarding the occurrence of pathogens and indicator organisms from a variety of different sources.

Phase 2 – to incorporate data in to QMRA and other frameworks

- Identify appropriate existing risk assessment frameworks and pathogen models for a variety of different applications (e.g., watershed models, beach receiving water models).
- Incorporate all data and results of the meta-analysis into these risk assessment frameworks and/or pathogen models.

Possible phase 3 (outside the scope of this RFP) – to test the models

- Demonstrate the use of the information obtained during Phase 1 and Phase 2 by comparison of risk assessment estimates with measured risk estimates from epidemiological studies in well-studied watersheds.

When responding to this RFP, proposers must explain how they propose to follow EPA's [Information Quality Guidelines](#), to ensure that data will be gathered and reported in format(s) that will be acceptable and can be applied in the criteria update process.

Key Milestones

The contract WERF will issue for this research effort will be structured to track key milestones and tasks. There are several obvious key milestones consistent with the phasing of this research (see below); however, WERF expects that proposing teams may wish to identify in their proposal additional points in the research that represent other key milestones.

As described above, a principal objective of this research is to provide the results within a 2-year timeframe so support EPA's efforts of revising the current recreational water quality criteria. Proposers are therefore asked to prepare a plan for the type and frequency of deliverables associated with these milestones and for the dissemination of findings to WERF subscribers and EPA in a useful and timely fashion. It is expected that data, findings, and other information will need to be made available as the research progresses.

Key milestones include the following:

Phase 1

- A report on data collection (e.g., sources, methods, findings, relevance). Describe the amounts, types and credibility of data and other information that are currently available regarding specific pathogen contributions (concentrations and loads) from different sources.
- Statistical summary of collected data
- A field sampling and analysis plan
- A report on the efforts and findings of the field sampling and lab analysis efforts
- Brief interim and final summaries of research progress, written for technical and non-technical audiences and suitable for posting on WERF website.

Phase 2

- Report on the availability and applicability of risk assessment frameworks and pathogen modeling tools.
- Report on the meta-analysis (e.g., methods, findings, relevance) and application of input data to modeling and risk assessment frameworks.
- Brief interim and final summaries of research progress, written for technical and non-technical audiences and suitable for posting on WERF website.

Communications Plan

The results of this research must be presented to, and understood by, the people who could most benefit from it. The proposal must include, as appropriate, the following communication plan components:

- Designation of target audiences, determination of the type of communications, and description of the communication activities and/or products.
- Identification of communication milestones, performance indicators, and feedback mechanisms.
- A communications budget.
- An agreement to provide a final report/product, at a date and in a form mutually agreed upon between the Principal Investigator, the WERF Program Director, and the WERF Director of Communications.

- A description of anticipated efforts to publish any results of this research. (Publications must cite WERF support. Publications may not infringe on WERF’s copyright for the interim and final product.)
- Description of intended presentations and/or briefings, including a list of specific conferences or other venues. This should include consideration of a WERF webinar(s).
- Intention to provide a list of related research and/or links to relevant information.

As part of the communications plan, the proposer may also wish to include a detailed plan explaining how/when they intend to provide:

- Web-based tools
- Feature articles for trade or consumer publications
- Other specific project-related products
- Demonstrations
- Workshops

Additional [guidance on the communications plan](#) may be accessed from the WERF website.

What Success Would Look Like

The successful completion of research described in this RFP would result in the following:

- A robust and quantitative dataset that is used to inform QMRA and other modeling tools enabling WERF subscribers to quantify the relative risks of various pathogen sources that they manage. *This would enable the subscribers to prioritize the implementation of appropriate treatment and control strategies to meet regulatory requirements.*
- EPA uses the research results in its criteria revision process. The revised water quality criteria are state-of-the-science and are effective, accurate, and flexible. *This would increase the applicability of the criteria to many WERF subscribers (e.g., ocean dischargers, stormwater utilities, dischargers to riverine systems, state regulatory agencies), and to public health agencies and other stakeholders including the public.*
- An increased understanding of the complicated relationship between pathogen occurrence and the presence of indicators. *This would enable WERF subscribers to have an increased level of confidence in the choice of indicators, methods, and processes for protecting public health.*
- The incorporation of information gathered on the measurement and relationship of waterborne pathogens (and/or their indicators) to exposure pathways and human health risks into microbial risk assessment models. *The resulting models would better enable states, utilities and other stakeholders to assess and manage risks to the public from water borne illnesses.*
- The use of the collected quantitative data in the testing of various pathogen models and QMRA frameworks. *This would enable WERF subscribers to identify those tools that are most appropriate for their respective situations.*
- The use of research results in strategically targeting management facilities and activities for pathogen reduction or control to ensure adequate health protection.
- The use of research results to provide valuable information regarding pathogens and indicators from wastewater and stormwater systems (treated and untreated).

Period of Performance

WERF seeks to provide information and tools to its subscribers, EPA and the water quality community in a timely fashion to help address the challenges they face. In order to maximize the utility of this research effort, and to facilitate the use information generated by this effort in EPA's revision/update of recreational water quality criteria, Phase 1 and Phase 2 of this research must be completed by the end of the third quarter of 2010.

Proposers must develop and propose a research plan and timeline that will assure the research effort and associated reporting tasks begin promptly and progress as quickly as possible/practical to achieve the desired goals of this high-priority research Challenge. During the proposal evaluation and selection process, WERF staff and the IAT will consider the proposers' abilities to define, establish, commit to, and act to meet aggressive timelines.

WERF Funding

WERF anticipates that the total cost for the research effort described in this RFP in Phases 1 and 2 could be as high as one million dollars. A significant portion of the funds for these two phases will come directly from WERF's solicited research budget. It is expected that proposers will bring the additional resources necessary to successfully achieve the objectives of this research.

Proposers need to present a detailed budget based on their anticipated scope of work. Proposers must identify and obtain commitments for funds beyond those requested from WERF. Proposers are encouraged to consider and identify opportunities for leveraging resources (dollars and other assets). Examples of such resources might include the following: external (e.g., grant) funding, partnerships with other funding agencies, engaging WERF subscribing utilities to share data or provide "test sites" for sampling, or other in-kind contributions. Priority will be given to those proposals that describe and offer to provide leveraging and collaborative opportunities.

Proposed budgets should match funding to milestones. Continued funding will be dependent upon successful attainment of milestone.

Selection Criteria

Proposals will be evaluated on the basis of the following factors/attributes:

- Demonstrated background, knowledge, and experience regarding pertinent elements of this Challenge. This includes the relevant science and technology and, as appropriate, stakeholder issues. The team's present knowledge of the state-of-the-science and state-of-practice will be considered here to be basic requirements (i.e., these requirements cannot be satisfied by an offer to conduct an initial-phase literature review or similar means).
- Demonstrated familiarity with EPA's Critical Path Science Plan, and the outline of an approach to track and utilize the deliverables from this RFP with EPA's efforts as both are developed. A plan for providing these interim deliverables in a format that can inform EPA's criteria updating process in the near term.
- Demonstrated ability of the proposing organization and its principal investigator(s) to identify, bring together, coordinate, and manage the team members needed to accomplish the proposed research. The project team should be multidisciplinary. The team's areas of knowledge and expertise should include, but not be limited to, environmental

microbiologists, epidemiologists, risk assessors, pathogen modelers, and engineers, with an eye toward the overall research agenda in this RFP.

- The outline of a succinct, creative plan/approach to meet the stated goals and to provide a product(s) that has a high likelihood of resulting in “success” as defined in the RFP.
- The ability to set and meet aggressive timelines that will move the research effort forward as quickly as possible/practical to achieve the desired objectives in 2 years.
- A competitive, realistic budget that matches funding needs to milestones.
- Inclusion of resource leveraging (external funds and in-kind) and collaborative partnering and the corresponding commitments. Must be incorporated into the proposed budget.
- A detailed communication plan specifying interim and final products, timelines and targeted audiences, and the commitment to work in coordination with WERF and its subscribers to provide the most appropriate products of greatest usability.

NOTES:

- Final proposals will need to meet applicable federal requirements regarding salary caps, Disadvantaged Business Enterprises, and paper reduction (as related primarily to the use of surveys). WERF will work with the selected team to address these survey requirements.
- WERF reserves the right to request interviews with proposers.
- WERF reserves the right to fund multiple proposals from a single RFP.

Examples:

- A proposer may indicate that its team is best suited to accomplish only discrete piece(s) to address certain aspect(s) of the overall Challenge.
- More than one team may be contracted to pursue related but different aspects.
- More than one team may be asked to join together another firm(s) and/or organization(s).
- WERF reserves the right to suggest and negotiate the addition of experts to proposed teams in order to bring the best talent to bear. Proposers cannot “lock up” experts to serve only on their team.

RFP Instructions

WERF’s [solicited RFP instructions](#) must be followed for submitting proposals.

References

U.S. EPA (2007). [Criteria Development Plan & Schedule—Recreational Water Quality Criteria](#): U.S. EPA Offices of Water and Research and Development: Washington, D.C., United States.

U.S. EPA (2007). [Critical Path Science Plan for the Development of New or Revised Recreational Water Quality Criteria](#), U.S. EPA Office of Research and Development: Washington, D.C., United States.

U.S. EPA (2007). [Report of the Experts Scientific Workshop on Critical Research Needs for the Development of New or Revised Recreational Water Quality Criteria](#), EPA 823-R-07-006, U.S. EPA Offices of Water and Research and Development: Washington, D.C., United States.