SON Number: ERSON-22-C3 **4 November 2020**

Strategic Environmental Research and Development Program (SERDP)

FY 2022 STATEMENT OF NEED

Environmental Restoration (ER) Program Area

IMPROVED UNDERSTANDING OF ECOLOGICAL TOXICITY AND RISK OF PER- AND POLYFLUOROALKYL SUBSTANCES IN AVIAN SPECIES

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to develop an improved understanding of the ecological toxicity and risk associated with per- and polyfluoroalkyl substances (PFAS) in avian species. The work proposed should lead to a better understanding of actual avian exposures via field measurements of PFAS in biological samples at or near Aqueous Film Forming Foam (AFFF)-impacted sites. The following sub-objectives are of interest:

- Develop an improved understanding of the uptake and excretion rates of PFAS by avian species to include assessment of correlation between effects reported in the scientific literature in laboratory exposures and observed population effects in the field. For any identified discrepancies between predicted and observed effects, determine potential causes of this discrepancy.
- Develop and/or validate modeling tools that can define exposures in comparison to established avian toxicity reference values (TRVs).
- Assess PFAS bioaccumulation and biomagnification throughout a food web with avian species as the receptor. Questions that could be addressed include:
  - Are PFAS accumulating in biota within avian food webs in areas of known AFFF use?
  - Which PFAS biomagnify? Does the relative distribution of PFAS change with each subsequent trophic transfer? What is the relative role of perfluoroalkyl acids (PFAA) precursors in determining total body burdens?
  - Do the collective data show direct pathways from soils/sediments/surface water to higher trophic levels?
- Determine whether observed PFAS mixtures in avian tissue, serum or eggs are correlated with any adverse population level effects. Such an assessment must primarily identify such mixtures from the literature or conduct small efforts to address data gaps.

Proposals may address one or more of the sub-objectives listed above. Exposures should be correlated with relevant ecological effect measurements including, but not limited to, mortality, fecundity, clutch size, fledge success, or other indicators of population health. Preference will be

given to proposals that adopt a holistic food web approach with emphasis on biomagnification through various prey/food items.

Proposers must provide the rationale and justification for the parameters of the study, including specific PFAS, biological endpoints, and environmental media. Additionally, proposers should provide a brief summary of their proposed analytical plan for measuring PFAS concentrations in biological media.

Substantial work has been conducted on understanding the ecotoxicity and ecological risk of specific PFAS. Investigators are encouraged to view past research and demonstrate how the proposed effort builds on previous efforts. A summary of SERDP-funded efforts in these areas can be found at the following web pages:

Ecotoxicity of Perfluorinated Compounds

Defining Knowledge Gaps in the Understanding of Per- and Polyfluoroalkyl Substances in the Subsurface

Ecological Risk Characterization of Per- and Polyfluoroalkyl Substances in the Subsurface: Bioavailability, Bioaccumulation and Biomagnification

2. Expected Benefits of Proposed Work

Addressing the research needs described above will meet a critical need for the Department of Defense (DoD) to better understand the environmental impact of AFFF-impacted sites. This improved understanding will directly impact the DoD's ability to manage these sites more cost effectively while being protective of human health and the environment.

3. Background

Ecological risk characterization for PFAS has been identified as a clear and immediate information gap by the Tri-Services Environmental Risk Assessment Working Group (TSERAWG) and the U.S. Environmental Protection Agency (EPA). PFAS are persistent in aquatic and terrestrial environments, and are known to accumulate in fish and wildlife. Management of PFAS-impacted sites requires ecological risk evaluations for listed and non-listed wildlife species. However, the basic PFAS ecotoxicological data necessary to derive soil- or sediment-based clean-up levels (CULs) for AFFF sites are lacking. While single compound CULs can be derived using standard soil or sediment toxicity tests, CULs for protecting higher trophic level organisms (e.g., threatened and endangered species) – or human health based on fish consumption – require a more complete understanding of fate and transport, as well as uptake, bioaccumulation, biomagnification, and trophic transfer kinetics.

Ecological risk assessments at AFFF sites are complicated by the fact that PFAS occur in complex mixtures, with over 200 different fluorinated organic chemicals having been identified in AFFF-impacted waters and soils so far. Biota are exposed to a mixture of PFAS, but what remains a critical research need is the bioaccumulation, food-web biomagnification, and the relative potency of both individual PFAS and the mix of constituents present at AFFF sites. Determining these relationships for a range of PFAS will allow more reliable risk assessments at AFFF sites.

SERDP is actively engaged in research to develop tools to assess PFAS ecological risks. Completed and on-going projects include developing TRVs for a range of freshwater and on land receptors, as well as the compilation of ecotoxicity TRVs from the scientific literature into tools that can be used for ecological risk assessments (see PFAS Ecotoxicity Risks: How SERDP is Closing the Knowledge Gaps). Understanding PFAS bioaccumulation, biomagnification, and toxicity to avian species in the field remains an important information gap. On-going research under SERDP will provide some data, but in addition to perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), there remains a need for uptake and toxicity data for readily bioaccumulable compounds such as perfluorohexane sulfonic acid (PFHxS), perfluorohexanoic acid (PFHXA), and perfluorobutanoic acid (PFBA), 6:2 Fluorotelomer Sulfonate (FTS), 8:2 FTS and other AFFF-occurring PFAS. These compounds are frequently detected as mixtures on DoD sites and are of increasing interest to regulators.

4. Cost and Duration of Proposed Work

The cost and time to meet the requirements of this SON are at the discretion of the proposer. Two options are available:

Standard Proposals: These proposals describe a complete research effort. The proposer should incorporate the appropriate time, schedule, and cost requirements to accomplish the scope of work proposed. SERDP projects normally run from two to five years in length and vary considerably in cost consistent with the scope of the effort. It is expected that most proposals will fall into this category.

Limited Scope Proposals: Proposers with innovative approaches to the SON that entail high technical risk or have minimal supporting data may submit a Limited Scope Proposal for funding up to $250,000 and approximately one year in duration. Such proposals may be eligible for follow-on funding if they result in a successful initial project. The objective of these proposals should be to acquire the data necessary to demonstrate proof-of-concept or reduction of risk that will lead to development of a future Standard Proposal. Proposers should submit Limited Scope Proposals in accordance with the SERDP Core Solicitation instructions and deadlines.

5. Point of Contact

Andrea Leeson, Ph.D.
Program Manager for Environmental Restoration
Strategic Environmental Research and Development Program (SERDP)
4800 Mark Center Drive, Suite 16F16
Alexandria, VA 22350-3605
E-Mail: Andrea.Leeson.civ@mail.mil

For Core proposal submission due dates, instructions, and additional solicitation information, visit the SERDP website.