



DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P.O. BOX 17300
FORT WORTH, TX 76102-0300

20 April, 2023

REQUEST FOR STATEMENT OF INTEREST
Number W9126G-23-2-SOI-2693

*Applicants must be a member in one of the Cooperative Ecosystem Studies Units (CESU):
Great Rivers / Southern Appalachian Mountains CESU Regions*

Project Title: Potential Bioaccumulated Contaminants in T&E Bat Food Sources

Responses to this Request for Statements of Interest will be used to identify potential investigators for this project. Approximately **\$226,914.71** is expected to be available to support this project for the **base year**. There will be no additional follow-on work for this agreement.

Background:

The purpose of this work is to (1) identify PFAS concentrations in streams on AAFB, (2) assess relative biomagnification of PFAS in stream food web components, and (3) identify potential PFAS transport pathways to terrestrial consumers on AAFB. PFAS biomagnification and stream to terrestrial PFAS transport will focus on emergent aquatic insect groups that are consumed by federally endangered gray bats on AAFB. We will focus on a subset of long chain PFAS, specifically PFOS and PFOA, which are associates with aqueous film forming foam used in firefighting on AAFB. Additional PFAS compounds of concern, such as perfluorobutanesulfonic acid (PFBS) will be included as possible.

Type of Award:

In accordance with section 6305 – *Using cooperative agreements of the Federal Grant and Cooperative Agreements Act of 1977* (31 U.S.C. § 6301 et seq.), all CESU projects must carry out a public purpose of support or stimulation, instead of acquiring goods or services for the exclusive direct benefit of the United States Government.

In accordance with section 6305 – *Using cooperative agreements of the Federal Grant and Cooperative Agreements Act of 1977* (31 U.S.C. § 6301 et seq.), substantial involvement is expected between the federal partner and the nonfederal partner when carrying out the activities specified in the project agreement. The exact nature of the government's involvement will be defined in the statement of objectives, issued with a request for full proposal.

As a result, it is anticipated that a cooperative agreement through the CESU program will be awarded. Such awards may be administered through a CESU only upon mutual agreement and official authorization by both parties of the acceptance of the application of the CESU Network IDC rate (17.5%).

NOTE: Must be a non-federal partner in the Cooperative Ecosystem Studies Units (CESU) Program to be qualified for consideration.

Brief Description of Anticipated Work:

This research focuses on the following objectives:

“See Attached Statement of Objectives”

NOTE: At this time we are only requesting that you demonstrate available qualifications and skills for performing similar or same type of work. You will be evaluated for request for a proposal based on skills and qualifications demonstrated in your SOI.

Period of Performance. The base year of agreement will extend 24 months from date of award. There will be no additional follow-on periods.

Materials Requested for Statement of Interest/Qualifications:

Please provide the following via e-mail attachments (Maximum length: 2 pages, single-spaced 12 pt. font).

1. Name, Organization, Cage Code, Duns number, and Contact Information (Email)
2. Brief Statement of Qualifications (including):
 - a. Biographical Sketch,
 - b. Relevant past projects and clients with brief descriptions of these projects,
 - c. Staff, faculty or students available to work on this project and their areas of expertise,
 - d. Any brief description of capabilities to successfully complete the project you may wish to add (e.g. equipment, laboratory facilities, greenhouse facilities, field facilities, etc.).

Note: A full study proposal and proposed budget are NOT requested at this time.

Review of Statements Received: All statements of interest received will be evaluated by a board comprised of one or more people at the receiving installation or activity, who will determine which statement(s) best meet the program objectives. Based on a review of the Statements of Interest received, an investigator or investigators will be invited to prepare a full study proposal. Statements will be evaluated based on the investigator’s specific experience and capabilities in areas related to the study requirements.

Please send responses or direct questions to:

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Timeline for Review of Statements of Interest: RSOI's required to be posted on www.Grants.gov for 30 days, prior to the Government making a decision and requesting full proposals. Responses are due by 5:00 P.M., Central Time, on May 26th, 2023

[End of RSOI]

STATEMENT OF OBJECTIVES

Potential Bioaccumulated Contaminants in T&E Bat Food Sources
Article III, (D) of the Southern Appalachian Mtns / Great Rivers
Cooperative Ecosystems Studies Units (CESU)

1. PURPOSE

This Scope of Objectives (SOO) provides the details of technical support to be performed for Arnold Air Force Base (AAFB) through a cooperative agreement (CA). The objective of this CA is to identify potential bioaccumulation of emerging contaminants in aquatic food sources of federally protected bats at AAFB.

Background

The forests and streams around AAFB contain a high diversity of wildlife and fishes, including imperiled species such as the federally endangered gray bat (*Myotis grisescens*) and gopher frog (*Lithobates capito*), as well as several other at-risk salamanders, fish, mussels, and invertebrate species. Concern for chemical contamination in AAFB streams has resulted in monitoring studies, such as assessing polychlorinated biphenyl (PCB) biomagnification in fish from Woods Reservoir (ATA 2016). Similar concerns exist for aquatic derived pollutant exposure to federally endangered gray bat colonies on AAFB, as this species relies on aquatic insects that emerge from streams and reservoirs as a primary food source (Best et al. 1997).

Per- and polyfluoroalkyl substances (PFAS) are an emerging group of contaminants that have become ubiquitous in the environment as they are present in many textiles, paper products, cookware, and flame retardants. Many US Air Force bases have a long history of PFAS use, specifically the PFAS compounds perfluorooctanesulfonate (PFOS) and perfluorooctanoic acid (PFOA) found in aqueous firefighting foams (Pozo et al. 2022). Recent PFAS measurements on AAFB found concentrations of PFOA+PFOS in soils and groundwater above the recommended EPA exposure levels (Amec Foster Wheeler 2018). This report also identified the potential for PFAS to have spread from point of use and waste disposal sites. Thus, there is potential for PFAS to have entered AAFB streams.

PFAS are long-lasting, fluorinated organic chemicals commonly found in the blood of people and animals and have been linked to harmful health effects in wild animals and humans (Bell et al. 2021). PFAS accumulates in organism lipid compartments, and thus would be expected to move through ecosystems and bioaccumulate in similar ways as PCBs (Dassuncao et al. 2019). Considering tests for PCBs in gray bat tissues from the region have shown bats collected on AAFB to have PCB levels approximately 10 times higher than bats residing in nearby areas of Tennessee and Kentucky (J. Lamb personnel communication), PFAS transport to terrestrial consumers, such as bats, may also occur. Many components of a stream food web have been found to bioaccumulate PFAS (Cervený et al. 2018), and some aquatic insects can retain PFAS following emergence to the adult stage (Koch et al. 2020, 2021). However, there is currently limited knowledge of PFAS transfer rates among trophic levels in a stream, or transfer pathways across the aquatic/terrestrial boundary.

General Objectives

The purpose of this work is to (1) identify PFAS concentrations in streams on AAFB, (2) assess relative biomagnification of PFAS in stream food web components, and (3) identify potential PFAS transport pathways to terrestrial consumers on AAFB. PFAS biomagnification and stream to terrestrial PFAS transport will focus on emergent aquatic insect groups that are consumed by federally endangered gray bats on AAFB. We will focus on a subset of long chain PFAS, specifically PFOS and PFOA, which are associated with aqueous film forming foam used in firefighting on AAFB. Additional PFAS compounds of concern, such as perfluorobutanesulfonic acid (PFBS) will be included as possible.

2. AUTHORITY

- 2.1 In accordance with the Sikes Act (Sec. 103A [16 USC 670c-1]) “the Secretary of a military department may enter into cooperative agreements with States, local governments, Indian Tribes, non-governmental organizations, and individuals...” This project is in support of the Integrated Natural Resources Management Plan (INRMP), as directed in the Sikes Act.
- 2.2 In agreement with the above stated goals, the recipient/cooperator agrees to provide the necessary personnel, equipment, and materials required to implement, in part, the Air Force responsibilities pursuant to the Endangered Species Act (16 USC 1531 et seq.), the Sikes Act Improvement Act, the Migratory Bird Treaty Act (16 USC 1361 et seq.), the National Environmental Policy Act (42 U.S.C. 4321 et seq.), and applicable implementing regulations, such as Air Force Instruction 32-7064, *Integrated Natural Resources Management*.
- 2.3 In accordance with section 6305 - *Using cooperative agreements of the Federal Grant and Cooperative Agreements Act of 1977* (31 U.S.C. § 6301 et seq.), all CESU projects must carry out a public purpose of support or stimulation, instead of acquiring goods or services for the exclusive direct benefit of the United States Government. Examples of carrying out a public purpose may include, but are not limited to, the following:
 - Project results are made available to a wide audience (including nonfederal entities)
 - Project results/outputs add to the scientific literature/knowledge base, with applicability and utility beyond the scope of the project footprint/study area
 - Academic and other nonfederal partner institutions (and their personnel) gain professional experience, increase knowledge, and develop skills and abilities
 - Students benefit from direct interaction with federal scientists, program and technical staff, and field unit managers
- 2.4 In accordance with section 6305 – *Using cooperative agreements of the Federal Grant and Cooperative Agreements Act of 1977* (31 U.S.C. § 6301 et seq.), substantial involvement is expected between the Department of Defense and the recipient when carrying out the activity contemplated by the cooperative agreement. The DoD agrees to participate at a national level in support of the CESU program as accepted in the Master

MOU for the establishment and continuation of the CESU program Article II 1-4 and Article VI 1-7.

- 2.5 The installation further (hence DoD) agrees to provide substantial involvement as directed under Article II (A) CESU Master Agreements to include, but are not limited to, the following:
- INSTALLATION is involved in development of study methodology, data gathering, analysis, and/or report writing
 - INSTALLATION actively participates and collaborates in carrying out the project plan of work, reviews and approves activities, helps train or select project staff or trainees
 - INSTALLATION incurs in-kind or direct expenditures in carrying out the activities specified in the project agreement.

3. DESCRIPTION OF OBJECTIVES

The contractor shall perform the following work elements for the project:

A. Study Plan Preparation:

Prepare a draft study plan that presents the detailed study approach, sample collection and analyses, and proposed data analysis plan. After approval of draft by AAFB, produce a final study plan.

B. Field Sampling, Foodweb, and PFAS Analysis:

Streams and the reservoir coves where each stream enters their respective reservoirs will be sampled. Each site will be sampled once in the spring/early summer. Due to the high potential for cross contamination during sample collection, only PFAS-free sampling equipment, storage containers, and collection techniques will be used as per USEPA sample guidelines. All Sample groups will be tested for PFAS, stable carbon and nitrogen isotope ratios, total carbon, nitrogen, and phosphorus content, and total lipid content. PFAS samples will be sent to a DoD-certified lab for analysis.

Identify PFAS concentrations in streams on AAFB. Stream/reservoir sediment and water will be collected at each site. Sediment will be collected using 15 cm deep cores from five locations at each site. Sediment samples will be combined and homogenized to produce one composition sample per site. Water will be collected from a representative location at each site.

Assess relative biomagnification of PFAS in the stream food web. Dominant stream food web components will be collected including sediment organic matter, biofilms, dominant macroinvertebrate groups, and fishes at each site. Macroinvertebrate collection will focus on aquatic emergent insect groups that are known to be consumed by gray bats. Collection of each group will be done using PFAS free plastic (e.g., polypropylene) cores, nets, or by hand to reduce potential PFAS contamination. Five independent samples of each dominant foodweb component will be collected at each site for lipid, isotope and nutrient content analysis. Carbon isotopes will be used to assess potential food resources of each consumer group, and nitrogen isotope used to assess trophic position in the food web. For PFAS, available

samples of each foodweb component will be combined to produce one sample of each component per site. Dominant aquatic insect groups consumed by gray bats such as Chironomid, Ephemeroptera, and Tricoptera will be separated as available. An isotope mixing model will be used to define trophic relationships of each dominant foodweb component, and PFAS concentration and lipid content of each group will be used to estimate relative PFAS bioaccumulation factors.

Identify potential PFAS transport pathways to terrestrial consumers. Terrestrial consumers and emergent aquatic insects will be collected at each site and analyzed for isotopes and PFAS with the same procedures as the aquatic organisms. Adult emergent insects will be collected using light traps deployed at each site. Riparian tetragnathid spiders will be used as terrestrial consumers, and act as surrogates for bats as they both consume similar aquatic insect prey. Spiders will be hand collected from each site. These organisms will be added to the stream food web trophic model to link sediment/water PFAS, emergent insect PFAS, and terrestrial consumer PFAS content.

C. Reporting:

Prepare a scientifically formatted report presenting the findings of the project.

1. The contractor will provide monthly email/phone updates as to the progress of the project.
2. The contractor shall provide draft reports (electronic copy) including all data collected. A summary and interpretation of data also will be provided.
3. Upon review (and subsequent return) of the draft reports, comments will be addressed, and the final reports will be submitted to Arnold AFB.
4. All geographic data will be provided for entry into the Arnold AFB GIS database. Format will be in SDSFIE 4.0 or determined in consultation with GIS specialist.

4. QUALIFICATIONS

The NFE should meet the minimum qualifications necessary to perform tasks described in the project work statement. The principal investigator should have experience directing the efforts of the project team. NFE personnel shall have the technical experience, the field implementation experience, any required state and federal certifications, and any required state or federal handling or application permits likely to be used in this project. The NFE shall furnish all labor, materials, equipment, supplies, technical expertise, and supervision needed to perform all field efforts.

5. GOVERNMENT FURNISHED MATERIALS OR PROPERTY

- 5.1 Physical Data: Arnold AFB shall provide access to any necessary data, existing reports, recent studies, and any other information necessary to complete the objectives of this scope.

- 5.2 Equipment: Government-furnished materials or property is governed by 2 C.F.R. Part 200.312 which states that a) Title to federally-owned property remains vested in the Federal government. The non-Federal entity must submit annually an inventory listing of federally-owned property in its custody to the Federal awarding agency. Upon completion of the Federal award or when the property is no longer needed, the non-Federal entity must return the property to the Federal awarding agency for further Federal agency utilization.

6. PERIOD OF PERFORMANCE

The Period of Performance (PoP) for this agreement shall be 24 months from date of award. There are no option periods.

7. COORDINATION

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8. DELIVERABLES

This agreement shall be implemented in accordance with the following schedules (assume award in February 2023).

Table 1. Project Schedule

Task	Date
Study Plan/Equipment Preparation	March – May 2023
Field Surveys	May – September 2023
PFAS and organism sample processing	June 2023 – November 2024
Report Preparation:	March - December 2024
Draft Report Submittal	November 2024 (tentative)
Final <u>Report</u> Submittal	<u>January 2025 (tentative)</u>

Table 2. Deliverables Schedule

Deliverable	Schedule	Distribution
Quarterly Progress Reports/Weekly Meetings: The NFE shall provide quarterly comprehensive progress reports. The NFE shall set up a monthly progress meeting/reporting with the AF PM and USACE PM to discuss progress, issues, and plans for the upcoming schedule.	Quarterly reports are to be delivered on the 10th day of each month via email.	Submission by email to Installation POC and USACE PM
Draft / Final Study Plan: Prepare and submit draft plan for government review and comment. Address government comments, and upon approval of comment responses, prepare and submit final report.	Draft Study Plan is due within 60 after award of agreement. Government shall be provided 30 days for review and comment. Comment responses and final report to be due within 21 days after government response.	Submit electronic copy to the Arnold AFB PM and USACE PM.
Draft Report: Prepare and submit draft report with all data collected. This shall include a summary and interpretation of data and spreadsheets listing all prey species detected from each bat species and the location(s) from which they were collected.	Draft report is due 60 days prior to the end of the period of performance.	Submit electronic copy to the Arnold AFB PM and USACE PM.
Final Report: Prepare and submit final report addressing government comments.	Submit draft final report for two-week inspection and feedback period by government. Final report due at 23 months after award of agreement.	Submit final report in electronic and hard copy to Arnold AFB and electronic copy only to USACE PM.
GIS Final Deliverables: Delivery of GIS data to be coordinated with the Arnold AFB GIS staff.	Submit with final report, or as determined through coordination with Arnold AFB.	Data to be submitted in SDSFIE 4.0 format (or latest version).

- 8.1 Study Plan (Draft and Final): The draft and final study plan shall include the following sections: Introduction; Methods, including lab techniques, sample analysis protocols, and data analysis; and schedule for project implementation.
- 8.2 Progress Reports:
MONTHLY: The contractor shall prepare monthly progress reports to include a summary of progress and results in all phases of the project, including any anticipated schedule alterations and a summary of resources consumed in a format agreed upon with AAFB.

QUARTERLY: The contractor shall submit quarterly progress reports to incorporate the monthly reports. Invoices for partial payment shall be submitted to coincide with receipt of the quarterly progress reports. No partial payment will be approved unless the government has received all progress reports.

8.3 Draft and Final Reports: The final report shall be prepared electronically, including but not limited to the following:

- Introduction describing the basis for the project and overall study approach
- Methods section including maps and descriptions of the study areas, lab techniques, analysis protocols, and data analysis
- Results section providing details of the study including data analysis
- Discussion section interpreting the study findings
- Recommendations for Future Study section detailing potential projects

8.4 Electronic data delivered in SDSFIE 4.0 format (or latest version) coordinated early in the project with AAFB GIS staff to ensure integration into AAFB's GIS. At 21 months after Receipt of Order, submit draft final report for two-week inspection and feedback period by government. Final report due at 23 months after Receipt of Order. Duration of project is expected to be Twenty-four months.

9. ADMINISTRATION

9.1 This cooperative agreement may be administered through a CESU only upon mutual agreement and official authorization by both parties of the acceptance of the application of the CESU Network IDC rate (17.5%).

9.2 Any resulting cooperative agreement will be subject to and recipient/cooperator shall comply with 2 CFR 200.313 "Equipment", 200.314 "Supplies", and 200.315 "Intangible Property" which includes use of research data.

10. REFERENCES

Amec Foster Wheeler (2018). Site Inspection Report. Site inspection of aqueous film forming foam (AFFF) release areas. Arnold Air Force Base, Manchester, Tennessee. Project No. RPMO201671118.

ATA. (2016). Woods Reservoir Fish Tissue PCB Environmental Monitoring Results for October 2015. ATA, Arnold AFB, TN.

Bell, E. M., De Guise, S., McCutcheon, J. R., Lei, Y., Levin, M., Li, B., et al. (2021). Exposure, health effects, sensing, and remediation of the emerging PFAS contaminants—Scientific challenges and potential research directions. *Science of the Total Environment*, 780, 146399.

Best, T. L., Milam, B. A., Haas, T. D., Cvilikas, W. S., & Saidak, L. R. (1997). Variation in diet of the gray bat (*Myotis grisescens*). *Journal of Mammalogy*, 78(2), 569-583.

Cervený, D., Grabic, R., Fedorova, G., Grabicová, K., Turek, J., Zlabek, V., & Randak, T. (2018). Fate of perfluoroalkyl substances within a small stream food web affected by sewage effluent. *Water research*, 134, 226-233.

Dassuncao, C., Pickard, H., Pfohl, M., Tokranov, A. K., Li, M., Mikkelsen, B., et al. (2019). Phospholipid levels predict the tissue distribution of poly-and perfluoroalkyl substances in a marine mammal. *Environmental Science & Technology Letters*, 6(3), 119-125.

Koch, A., Jonsson, M., Yeung, L. W., Karrman, A., Ahrens, L., Ekblad, A., & Wang, T. (2020). Per-and polyfluoroalkyl-contaminated freshwater impacts adjacent riparian food webs. *Environmental Science & Technology*, 54(19), 11951-11960.

Koch, A., Jonsson, M., Yeung, L. W., Karrman, A., Ahrens, L., Ekblad, A., & Wang, T. (2021). Quantification of biotransfer of per-and polyfluoroalkyl substances from the aquatic to the terrestrial environment via emergent insects. *Environmental Science & Technology*, 55(12), 7900-7909.

Pozo, K., Moreira, L. B., Karaskova, P., Přibyllová, P., Klánová, J., de Carvalho, M. U., & de Souza Abessa, D. M. (2022). Using large amounts of firefighting foams releases per-and polyfluoroalkyl substances (PFAS) into estuarine environments: A baseline study in Latin America. *Marine Pollution Bulletin*, 182, 113938.

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