



DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
819 TAYLOR STREET
FORT WORTH, TX 76102

7 June 2021

REQUEST FOR STATEMENTS OF INTEREST
NUMBER W9126G-21-2-SOI-3842
PROJECT TO BE INITIATED IN 2021

Applicants must be members in one of the following Cooperative Ecosystem Studies Units (CESU): South Florida-Caribbean, Piedmont – South Atlantic Coast, Gulf Coast

Project Title: Wet Season Aquatic Fauna & Primary Production in Florida Everglades.

Responses to this Request for Statements of Interest will be used to identify potential investigators for a project to be funded by the U.S. Army Corps of Engineers, Engineer Research and Development Center, which will provide wet season aquatic fauna and primary production monitoring in the Florida Everglades in accordance with 10 U.S.C. § 2358 - Research and Development.

Approximately **\$488,537.00** is expected to be available to support this project during the **base period**. Additional funding may be available for follow on work in subsequent fiscal years to the successful Recipient/Awardee.

Background:

The Comprehensive Everglades Restoration Plan (CERP) 2009 Monitoring and Assessment Plan (MAP) documents the trophic hypothesis cluster that forms the basis of results-oriented monitoring programs to measure restoration success (RECOVER 2009). A key aspect of the trophic hypothesis is that restored hydrology (e.g., water depth, duration, flow, and distribution) in an oligotrophic system will improve primary production (e.g., periphyton) and aquatic fauna (e.g., crayfish, small fish, and grass shrimp) during the wet season that concentrates during the subsequent dry season to support higher trophic organisms (e.g., wading birds, alligators) (RECOVER, 2009). Periphyton is the base of the trophic hypothesis food chain and are important indicators of improved hydrology and oligotrophic conditions in the Everglades. Small aquatic prey production trends during the wet season are indicators of restored hydrologic conditions.

Primary production, more specifically periphyton, is directly affected by hydrologic and nutrient stressors, which change periphyton communities and biomass that supports aquatic fauna production during the wet season. Periphyton total phosphorus content, diatom species composition, and biomass metrics also indicate oligotrophic nutrient status in the Everglades ecosystem, which is a key defining characteristic of a restored healthy Everglades system (South Florida Ecosystem Restoration Task Force [SFERTF] 2010; Gaiser et al. 2009). Multi-metric (total phosphorus [TP] concentration in periphyton and ratio of periphyton community type [endemic species to weedy species]) increases accuracy of detecting oligotrophic changes in

wetlands by 18% compared to just measuring periphyton TP concentrations and biomass (RECOVER, 2014). Periphyton indicator use in stoplight reporting is based on the risk assessment framework adopted by the U.S. Environmental Protection Agency for streams and wetlands (Stevenson 1998, Stevenson and Smol 2003, Stevenson 2010). The relationship between periphyton attributes and Phosphorus are well understood for the Everglades (McCormick and Stevenson 1998; Gaiser and Ruhland 2010). How periphyton changes in response to CERP implementation overtime in a changing climate is still unknown and requires long-term data sets on trends to improve predictive capabilities in forecasting and verifying CERP performance.

Wet season prey production and trends in aquatic fauna biomass and species composition are key indicators of ecosystem status and hydrologic restoration trends (SFTRF, 2010; Trexler 2009). Primary and secondary consumer (which eat periphyton and are prey for higher consumers) density and diversity change in relationship to periphyton structure, abundance and composition, and explain variances in consumer response to hydrologic disturbance (Sargeant et al. 2010, 2011). Research has shown that long-term trends in aquatic fauna biomass and composition are sensitive to water management (structural and operational changes). These long-term data sets have resulted in predictive tools to support Everglades restoration planning, as well as reporting of Everglades ecosystem status and trends. Additional key questions remain regarding the movement and distribution of aquatic fauna (both primary [small fish and invertebrates] and secondary [large fish including sportfish] consumers) with respect to restoration of hydrologic connectivity, timing, distribution, in addition to overall water depth and durations trends.

Type of Award:

The Authority to enter into a Cooperative Agreement: 10 U.S.C. § 2358 - Research and Development for Wet Season Aquatic Fauna and Primary Production in the Florida Everglades.

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 *South Florida-Caribbean, Piedmont – South Atlantic Coast, Gulf Coast* CESU Unit Region.

Brief Description of Anticipated Work:

This research focuses on the following objectives:

- Establish pre-CERP (Everglades Scale) and CERP project (regional/local scale) reference conditions and variability in primary production (periphyton) and aquatic fauna (prey)
 - Determine the status and trends of periphyton and aquatic prey populations over short, medium, and long-term temporal and spatial scales.
 - Detect unexpected responses of the ecosystem (periphyton oligotrophic nutrient status and wet season prey production) to changes in stressors resulting from CERP activities and Climate
 - Support scientific investigations and tool development designed to increase ecosystem understanding, cause and effect, and interpret unanticipated results in primary producers and wet season prey performance
 - Prepare summary report of data, analysis, and conclusions related to study objectives for each funded period of performance and final synoptic report at the conclusion of this study. These reports will be disseminated by USACE for public education and potential academic use.
1. Sample wet season prey using primary sampling units grouped within landscape sampling units (LSUs) following the guidelines from Philippi (2003, 2005) and based on a spatially balanced recursive tessellation design (Stevens and Olsen 2004) as identified in the 2013 Aquatic Fauna and Periphyton Production Report (Trexler and Gaiser 2013). Prey must be sampled across Landscape Sampling Units in the Water Conservation Areas and Everglades National Park during the late wet season (September to November). Species counts, weight (g/m^2) must be recorded. Prey sampling should be done using throw traps for data consistency with prior sampling years. This is also an option year task.
 2. Sample periphyton using primary sampling units (PSUs, 800 m^2 areas) grouped within landscape sampling units (LSUs), choosing three random coordinates within Primary Sampling Units for sampling as explained in (Trexler and Gaiser 2013) using CERP Quality Assurance Systems Requirements protocols (CERP, 2007). Water depth must be between 5cm and 1m with no dense macrophyte cover (e.g., cattail stands, sawgrass ridge, tree island). 120-190 sites should be visited during mid-wet season Jul-Sep with a subset of those sites (50-60) revisited twice during the dry season (December to April). Triplicate samples of periphyton must be taken using mesh sized 1m^3 trap to enclose marsh. Periphyton aerial cover (%) visually assessed and periphyton removed and measured for biovolume (ml/m^2) using perforated graduate cylinder. Sub samples are taken to lab to estimate dry weight (mass after drying to constant weight at 100°C , ash-free dry mass (difference between dry mass and loss after combustion) and chlorophyll a mass ($\text{micro grams}/\text{m}^2$). In addition, the following must be collected at each sampling site to understand site characteristics related to periphyton: water depth using a meter stick; water samples for pH and conductivity; plant cover

estimate as proportion of m² quadrat covered by plants and stem density; and soil depth measured to bedrock with probe-rod. This is also an option year task.

3. Collected data must be analyzed and report the following:
 - a) Periphyton Data - Chlorophyll a concentration (micro grams/ gram of dry weight), periphyton TP (micro grams/ g dry weight), and mineral content (%), or converse, organic content), compositional analyses to enumerate soft algae (relative biovolume of species) and diatom assemblage (relative abundance of taxa), and non-calcareous diatoms (sum of all non-endemic taxa (see Gaiser et al., 2006) in a multimetric index (stoplight indicator) approach (see Gaiser 2009) and related to hydrologic and other abiotic factors occurring in time and space at local project, regional, and system scales. Base year to include identification of over 1,500 samples collected from 2012 through 2016. Unless otherwise specified, option year tasks would focus only on periphyton biomass, TP, chlorophyll, and mineral content analyses.
 - b) Aquatic Fauna – Species composition and biomass compared to hydrologic conditions and other abiotic and biotic conditions occurring in time and space at local (CERP project), regional, and system scales. Summary of data should be compared to hydrology to identify mean biomass (g/m²) wet weight for crayfish (*Procambarus fallax* and *P. alleni*), marsh fishes (all species summed), and grass shrimp (*Palaemonetes paludosus*).
 - c) Hypotheses - Analyses should compare primary production and wet season aquatic fauna to dry season concentrations of prey and wading bird and alligator abundance and nesting trends collected by other principle investigators and coordinated through the RECOVER Greater Everglades interagency subteam.

4. Participation in Regional Team Support:

The PI shall be required to work with the Greater Everglades Regional Team and the Regional Coordinator(s) to assist in the development of upcoming RECOVER System Status Report (SSR) and Interim Goals and Interim Targets (IGIT) Report.

Additional Optional Tasks:

1. Additional sampling sites in LSUs beyond Water Conservation Areas and Everglades National Park (i.e., Corbette/Pal Mar; Western Basins; Big Cypress; Holeyland and Rottenberger).
2. Assist with RECOVER Performance Measure updates to the Prey-based Fish Density Performance Measure (Greater Everglades Aquatic Trophic Levels) and Periphyton TP and Edibility Performance Measure.

3. Research to address CERP Program-Level Adaptive Management Plan Questions (RECOVER 2015), such as, small and large fish movement between marsh and canals.

Period of Performance. The base period of agreement will extend 12 months from award.

Option Period: Four option periods extending for 12 months each subject to availability of funds.

Materials Requested for Statement of Interest/Qualifications:

Please provide the following via e-mail attachment to: Alisa.Marshall@usace.army.mil and Gregory.W.Bonnell@usace.army.mil (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:

Ali Marshall
Contract Specialist
USACE, Fort Worth District
Phone: (817) 886-1068
Email: alisa.marshall@usace.army.mil

Greg Bonnell
Project Manager
Regional Planning and Environmental Center
U.S. Army Corps of Engineers 
Gregory.W.Bonnell@usace.army.mil
Cell. (918) 951-05

Timeline for Review of Statements of Interest: The RSOI is required to be posted for 30 days

prior to the Government making a decision and requesting full proposals. Responses due by 5:00 P.M. Central Time, on **7 July 2021**.

[End of RSOI]

Literature Cited:

- Comprehensive Everglades Restoration Program (CERP) 2009. CERP Monitoring and Assessment Plan. Comprehensive Everglades Restoration Plan, Restoration Coordination and Verification (RECOVER).
- Comprehensive Everglades Restoration Program (CERP) 2007. Quality Assurance Systems Requirements: Periphyton.
- Gaiser, E. 2009. Periphyton as an indicator of restoration in the Everglades. *Ecological Indicators*. 9: S37-S45.
- Gaiser, E. E., J. H. Richards, J. C. Trexler, R. D. Jones & D. L. Childers. 2006. Periphyton responses to eutrophication in the Florida Everglades: Cross-system patterns of structural and compositional change. *Limnology and Oceanography* 51: 617-630.
- Gaiser, E. and K. Rühland. 2010. Diatoms as indicators of environmental change in wetlands and peatlands. In Smol, J. and E. Stoermer (Eds.), *The Diatoms: Applications in Environmental and Earth Sciences*. Cambridge. pp. 473-496.
- McCormick, P.A., & R.J. Stevenson. 1998. Periphyton as a tool for ecological assessment and management in the Florida Everglades. *J. Phycol.* 4: 726-733.
- Philippi, T. 2003. Final Report. CERP Monitoring and Assessment Plan: Stratified Random Sampling Plan. South Florida Water Management District.
- Philippi, T. 2005. Final report. CERP MAP Implementation: Transect and Sentinel Site Sampling Design. South Florida Water Management District.
- RECOVER. 2006. Monitoring and Assessment Plan (MAP), Part 2 2006 Assessment Strategy for the Monitoring and Assessment Plan. Restoration Coordination and Verification Program c/o US Army Corps of Engineers, Jacksonville District, Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL.
- RECOVER. 2009. Revised CERP Monitoring and Assessment Plan. Restoration Coordination and Verification Program c/o US Army Corps of Engineers, Jacksonville District, Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL. http://141.232.10.32/pm/recover/recover_map_2009.aspx
- RECOVER, 2014. 2014 System Status Report – Greater Everglades Chapter. http://141.232.10.32/pm/ssr_2014/Docs/mod_ge_2014.pdf
- RECOVER, 2015. CERP Program-Level Adaptive Management Plan. http://www.saj.usace.army.mil/Portals/44/docs/Environmental/RECOVER/20151019_CERPPROGRAMA_MPLAN_DCT_APPROVED.pdf
- Sargeant, B., E. Gaiser & J. Trexler. 2010. Biotic and abiotic determinants of intermediate-consumer trophic diversity in the Florida Everglades. *Marine and Freshwater Research*. 61: 11-22. 36

- Sargeant, B., E. Gaiser and J. Trexler. 2011. Indirect and direct controls of macroinvertebrates and small fish by abiotic factors and trophic interactions in the Florida Everglades. *Freshwater Biology*. 56: 2334-2346.
- South Florida Ecosystem Restoration Task Force 2010. System-wide Ecological Indicators for Everglades Restoration. 2010 Report. http://www.sfrestore.org/documents/Final_System-wide_Ecological_Indicators.pdf
- Stevens D. L. and A. R. Olsen. 2003. Variance estimation for spatially balanced samples of environmental resources. *Environmetrics* 14:593-610.
- Stevenson, R. J. 1998. Diatom indicators of stream and wetland stressors in a risk management framework. *Environmental Monitoring and Assessment* 51: 107–18.
- Stevenson, R. Jan, and John P. Smol. 2003. Use of algae in environmental assessments. In J. D. Wehrand and R. G. Sheath. *Freshwater Algae in North America: Classification and Ecology* Academic Press, pp. 775-804.
- Stevenson, R. J., Y. Pan, and H. Van Dam. 2010. Assessing environmental condition in rivers and streams with diatoms. In J. P. Smol and E. F. Stoermer, Eds. *The Diatoms: Applications for the Environmental and Earth Sciences*, 2nd Edition. Cambridge.
- Trexler, J. C. and C. W. Goss. 2009. Aquatic fauna as indicators for Everglades restoration: Applying dynamic targets in assessments. *Ecological Indicators* 9:108-11
- Trexler, J.C. and E. Gaiser. 2013. Annual Report – Aquatic Fauna and Periphyton Production Data Collection. Miami, FL: Southeast Research Center, Department of Biological Sciences, Florida International University. http://141.232.10.32/pm/ssr_2014/Docs/wet_season_aquatic_fauna_periphyton_2013.pdf