

# **REQUEST FOR STATEMENT OF INTEREST FOR PROJECT TO BE INITIATED THROUGH COOPERATIVE ECOSYSTEM STUDIES UNITS (CESU) NETWORK**

**Eligibility is limited to non-federal members of the Gulf Coast CESU, Piedmont South Atlantic CESU and the South Florida Caribbean CESU.**

**Project title:** Determining need for management of invaded mangrove and coastal prairie plant communities.

Responses to this Request for Statement of Interest will be used to identify potential collaborators for a project funded by the National Park Service (NPS) to assist with assessing impacts from Hurricane Irma on invasive plants in coastal habitats within Everglades National Park (EVER) that were impacted by Hurricane Irma in 2017. The NPS is requesting information on your interest and qualifications to provide support for this task.

The authority for this Cooperative Agreement is 54 U.S.C. § 101702(b) (Cooperative Research and Training Programs). Substantial involvement is expected between the NPS and nonfederal partner when carrying out the activities specified in the scope of work and may include activities such as the NPS's involvement in the development of study methodology, data gathering and analysis; review of work plans, reports and all deliverables; providing staff time to oversee, sharing previously collected available data, and participate in the collection of field data.

This proposed project contributes to the objectives of the Cooperative Ecosystem Studies Units (CESU) network by providing usable knowledge to support informed decision making; creating and maintaining effective partnerships among the federal agencies and universities to share resources and expertise; encouraging professional development of current and future federal scientists, resource managers, and environmental leaders; and managing federal resources effectively. In addition, this work is consistent with the South Florida Caribbean CESU mission of providing research, technical assistance, and education to federal land management, environmental, and research agencies.

## **Background and Overview**

The mangrove forests and coastal prairies in EVER are some of the dominant vegetation communities of EVER. The resilience of these communities to storms and storm damage is also critical to maintaining the condition of freshwater wetlands landward of these communities, which contribute significantly to the unique biota of Everglades National Park. Over the past 25 years, invasive plants have invaded mangroves and coastal prairies of EVER. We currently estimate over 40,000 acres are infested with Brazilian pepper (*Schinus terebinthifolia*), over 9,000 acres infested with Old World climbing fern (*Lygodium microphyllum*), and over 2,000 acres of latherleaf (*Colubrina asiatica*).

In September of 2017, Hurricane Irma passed south of Flamingo in southern EVER, producing high wind and major storm surge flooding of coastal habitats. Storm surge and wind affected Cape Sable, Florida Bay, and the west coast of EVER including mangrove and coastal marsh habitats.

The impacts to these vegetation communities included inundation by salt water, defoliation and structural damage, and subsequent prolonged inundation by fresh water. We propose to assess the

region using existing data, such as the 2013 Digital Aerial Sketch Mapping data, aerial imagery, vegetation maps and comparing with post storm field data collection to focus on key areas, such as Cape Sable, Florida Bay islands, Highland Beach, north shore of Florida Bay, areas around the Broad and/or Harney Rivers, and measure invasive vegetation response over time. Initial evaluation indicated that some invasive plants were killed by storm surge, but resprouting has occurred. In other areas, native forest canopy was decimated and invasive species have increased. Determining the outcomes will be essential to assessing the potential for hurricane-related changes in coastal communities and the neighboring freshwater wetlands, and will inform prioritization of invasive plant management in this area to help protect rare coastal plant communities and community resilience.

## **Objectives**

Assess the impacts of Hurricane Irma on coastal invasive-plant species of EVER. The project will inform and improve invasive plant management following similar events, make recommendations that will assist EVER in understanding and responding to similar future events. Impacts to the coastal plant communities include defoliation, structural damage, inundation by salt water, and subsequent prolonged inundation by fresh water. We propose to assess how invasive-plants responded to these impacts using new and existing field data and, if possible, a greenhouse/laboratory study. Existing data includes, but is not limited to the 2013 Digital Aerial Sketch Mapping data, aerial imagery, and vegetation maps. Gathering the post storm effects, on invasive plants, is essential for understanding hurricane-related changes in coastal communities and neighboring freshwater wetlands, and it will inform prioritization of invasive-plant management while helping protect rare coastal-plant communities and maintaining community resilience.

## **Possible Research Questions**

- In areas affected by Hurricane Irma were there impacts to biological controls or to plant communities that could influence biological controls? Are there thresholds for introducing biological controls beyond which no additional exotic species removal/reduction effect is accomplished? If a threshold exists, how is it influenced by the patchy occupancy pattern of an exotic species across a landscape?
- How did Hurricane Irma influence non-native plants being introduced into natural areas and/or shell mounds? Are there spatially explicit invasion corridors associated with tropical storms? How can we more effectively monitor areas/corridors of invasion and detect new introductions?
- What are the best methods, post storm, for detecting exotic plant species in the sub-canopy of remote locations, particularly before an area has been extensively occupied?
- In areas affected by Hurricane Irma what are the strengths and weaknesses of existing and developing methods for detecting exotic plants? Are there any post tropical storm/hurricane monitoring or treatment strategies that are effective at monitoring or controlling Brazilian pepper, Old World climbing fern, latherleaf, or other FLEPPC category I and II plant species?
- In areas affected by Hurricane Irma what are the gaps in control techniques that are available to resource managers for high priority exotic plant species? Identify novel approaches to exotic plant

species control and compare these to traditional methods in terms of cost, effectiveness, and collateral effects on nearby native species.

- In areas affected by Hurricane Irma how are the effectiveness of control techniques and collateral effects on native species affected by the spatial patterns and characteristics of native Everglades communities, combined with patterns of invasion? What options are available for mitigating or minimizing collateral effects?

### **Possible Specific Tasks**

- Determine the effects of salinity on biological control organisms and their target host invasive plants found in coastal areas, examples how does salinity affect *Lygodium microphyllum* and *Neomustima conspurcatalis* and/or *Floracarus perrepae* and how does salinity affect *Schinus terebinthifolia* and *Pseudophlothrips ichini* and *Calophya latiforceps*.

-Map of priority invasive plants (*Casuarina* spp., *Schinus terebinthifolia*, *Melaleuca quinquenervia*, *Colubrina asiatica*, *Thespesia populnea*, *Agave sisalana*, *Lygodium microphyllum*, *Scaevola taccada*, *Cocos nucifera*, or other Florida Exotic Pest Plant Council (FLEPPC) category I and II plant species) on the islands of Florida Bay, Cape Sable, Highland Beach, north shore of Florida Bay, areas around the Broad and/or Harney River.

-Determine if there is a more effective or optimal time post hurricane for the most effect control/treatment efforts to take place. For example is there an advantage to treating priority invasive plants 2-12 months post storm over treating more than 12 months post storm.

- Determine the range of coastal areas impacted by Hurricane Irma and identify impacts to priority invasive plants species within that range.

- Field study to determine and assessment direct impacts, such as deposition of sediment, rubble, seagrass wrack lines, or erosion from Hurricane Irma on priority invasive species. Survey the new areas of deposition for new infestations of priority invasive plants.

-Compare 2013 Digital Aerial Sketch Mapping distribution and cover of priority invasive plants (*Melaleuca quinquenervia*, *Casuarina* spp., *Schinus terebinthifolia*, and *Lygodium microphyllum*) with current post Hurricane Irma distribution and cover and determine effect and impact of Hurricane Irma on priority plants.

- Compare Southwest Coastal Everglades (Region 3 of “The Everglades National Park and Big Cypress National Preserve Vegetation Mapping Project” <https://irma.nps.gov/DataStore/Reference/Profile/2256787>) or other Everglades National Park coastal vegetation maps distribution and cover of priority invasive plant species with current post hurricane Irma distribution and cover and determine effect and impact of Hurricane Irma on priority plants.

-Acquire a baseline reference, including mapping, of current invasive plant conditions for reference for future tropical storm events.

-Greenhouse and/or field study of the impact on salinity/inundation on coastal invasive plants such as *Colubrina asiatica* or other FLEPPC category I and II plant species.

## **Period of Performance**

The period of performance for this Task Agreement will be 24 months from the award date. The NPS plans to have an agreement signed and begin project work by March 1, 2020.

## **Materials Requested for Statement of Interest/Qualifications**

Please prepare a brief (3-4 page) summary of how you would envision conducting such a collaborative project. Statement of Interest should include the research topic or topics to be addressed by the proposed project as well as an estimated budget. Research topics are not restricted to those included under possible research questions in this announcement. Include your name, CESU affiliation (university or non-profit organization eligibility affiliated with the Gulf Coast, Piedmont South Atlantic or the South Florida Caribbean CESU) and contact information as well as any relevant experience, past projects, and staff, faculty and students that would be available to work on the project.

## **Potential Funding**

Total funding in the amount of ~\$240,000 is anticipated to support one or more projects resulting from this RSOI.

## **Review of Statements Received**

All statements of interest received will be evaluated by a committee comprised of two or more National Park Service scientists, 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 demonstrated skills in conducting mapping, invasive plant surveys, previous experiences studying at the park or region will also be considered, including experience conducting National Park Service natural resource damage assessments. Because of the broad scope of this project, an interdisciplinary approach is necessary.

## **Please direct all questions to:**

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## **Replies requested by: Not later than December 15, 2019, 11:59 PM EST. Please submit electronic statements of interest to:**

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