

2022 COOPERATIVE SUMMER FELLOWSHIP PROGRAM – PROJECT PROPOSAL

APPLICANT TYPE: ESA;

PROJECT TITLE: DEVELOPING NEW, SUSTAINABLE CONTROL STRATEGIES FOR AN INVASIVE WETLAND GRASS (PHRAGMITES AUSTRALIS)

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Discipline: Ecology;

PROJECT DESCRIPTION

BACKGROUND

Background Information:

Control of invasive plant species is important to preserve native habitats and is a high priority for many land management agencies. The non-native *Phragmites australis* (common reed) is an aggressive invader of high-quality wetlands and lakeshores and a major nuisance species along roadsides and public access areas. Conventional treatment approaches such as burning, manipulating water levels, mowing, and herbicides are expensive, not species-specific, and generally not effective long-term. Therefore, the development of novel management strategies is of significant value and interest to land managers across North America. The USGS Great Lakes Science Center (GLSC) is engaged in research to find more sustainable, species-specific control mechanisms for non-native *Phragmites* and other invasive species. Scientists are currently testing (1) alterations to the microbiota (bacteria, fungi) communities that occur in and around invasive plants and (2) genetic-based approaches (e.g., RNA-based gene silencing) to control the most aggressive traits of *Phragmites*. Additionally, GLSC researchers are exploring the impact that high water levels in the Great Lakes have on existing *Phragmites* populations and whether high water can aid management efforts in coastal areas. All of this work is done in the context of research on Great Lakes coastal wetland protection, enhancement, and restoration.

Objectives:

The successful candidate will assist with on-going projects advancing new control strategies for non-native *Phragmites*. Specifically:

- Continue research on the impact of soil enhancements on microbial communities and *Phragmites* growth and performance
- Manage greenhouse operations to support the needs of on-going *Phragmites* control studies
- Continue to identify important genetic pathways that could be manipulated to decrease *Phragmites* invasion success
- Consider the influence of invasive species in wetland structure and function
- Assist with field and greenhouse studies exploring the impacts of high water on *Phragmites* health

INTERN TASKS

- Microbial manipulation experiment:
 - o Work closely with USGS scientists and partners to plan and deploy field experiments exploring the effects of soil amendments on soil microbe and/or fungi communities and Phragmites performance
 - o Collaborate with team members to develop standardized field methods
 - o Assist with preparation and application of potential treatments
 - o Monitor health and growth of Phragmites and competing plant species over the duration of the experiment
 - o Harvest and process plants at conclusion of field studies
 - o Prepare plant matter for final analyses (clean, dry, weigh, etc.)
 - o Analyze field data as part of a collaborative team
 - o Prepare findings for poster and/or internal presentation for GLSC and partners
- General greenhouse operations / maintenance
 - o Grow Phragmites plants from seeds and rhizomes to supply current control experiments
 - o Maintain basic greenhouse operation including overall plant care, watering, pruning, and basic greenhouse maintenance
- Exploring genetic pathways:
 - o Work with USGS and U.S. Army Corps of Engineer scientists to develop new treatments targeting the molecular processes that drive Phragmites performance, specifically help plan and implement field experiments exploring the effects of species-specific genetic biocontrol treatments
- Wetland ecology:
 - o Work with USGS and USFWS staff to monitor wetland restoration projects and characterize the condition of plants, fish assemblages, water quality, and other parameters
- Water-level impacts:
 - o Assist USGS and USFWS staff with the setup and implementation of field studies

BENEFITS TO INTERN

This collaborative project will yield important insights into alternative, innovative invasive species management strategies of great importance to the land management community. The Great Lakes Science Center engages in partner-focused science, providing a unique opportunity for an intern to learn how to craft a research project with high relevance to current management needs while gaining valuable experience in laboratory and field settings. The intern will work closely with mentors to craft an experimental design and research plan that aligns with land management needs and is feasible in a single field season. The intern will gain experience with data collection,

data management, and analysis. In addition, the intern will be able to take advantage of close relationships to the wildlife and land management communities to present findings to relevant groups (e.g., Great Lakes Phragmites Collaborative, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineer scientists). This is a unique opportunity to gain research experience, contribute to high-priority federal science, and build a professional network within the research and land management communities.

MENTORING PLAN

The intern will be integrated with USGS staff during all phases of the internship. S/he will have daily interactions with the USGS team and meet with the lead scientist regularly to discuss scientific and operational aspects of the internship. The intern will also be involved with weekly team meetings and monthly center-level staff meetings to learn about other projects, budgets, and the overall operation of federal science. There also will be opportunities to meet with the lead scientist and other scientists to discuss job, academic, and other career-building opportunities. Finally, the team will support the intern's development of a final product (e.g., poster, oral presentation), which will build analysis, interpretation, and communication skills.

ADDITIONAL DETAILS

STUDENT SKILLS AND INTERESTS

The desired candidate should be pursuing a degree in biology, ecology, environmental or wildlife sciences or similar with a strong interest in invasion ecology, microbial ecology, and/or habitat restoration. A basic understanding of botany, plant physiology, microbiology, and/or genetics is desirable.

LOCATION: Ann Arbor, MI (some work can be virtual)

ACTIVITY LEVEL:

Level 8-2: The work requires some physical exertion such as long periods of standing, walking over rough, uneven, or rocky surfaces; recurring bending, crouching, stooping, stretching, reaching, or similar activities; or recurring lifting of moderately heavy items. The work may require specific, but common, physical characteristics and abilities such as above-average agility and dexterity.

FIELD WORK	25-50%	VIRTUAL?	No
LAB WORK	25-50%		
OFFICE WORK	25-50%		
OTHER	0-25%		

PROJECTED START DATE 5/2/2022

EXPECTED DURATION 12 weeks with potential for extension based on need and available funding