

USGS NSF GRIP, GSP Opportunity

Point of Contact Name:	Noel B. Pavlovic
Point of Contact Email:	npavlovic@usgs.gov
USGS Center:	Great Lakes Science Center
Project Title:	Linking sand dune dynamics to Pitcher's thistle metapopulations
Summary:	Spend a summer on the shore of Lake Michigan, investigating the role that dynamic dune disturbance and successional processes play in the spatial metapopulation dynamics of Pitcher's thistle, a federally threatened plant. This project will provide a basis for developing spatial population models that can indicate the present and future conditions for the species in the Great Lakes.
Project Hypothesis or Objectives:	We wish to better understand the relationship between sand dune processes and metapopulation dynamics of Pitcher's thistle (<i>Cirsium pitcheri</i>), a Federally threatened monocarpic perennial endemic to the sand dunes of the western Great Lakes. We hypothesize that covariation in sand disturbance and succession drive the spatial dynamics of Pitcher's thistle populations in the non-forested dune landscapes. We propose to use historic plant distribution data (1991, 2005, 2008, and recent data) and aerial photographs and lidar data to investigate spatial relationships between sand disturbance and succession and their roles in constraining plant distribution. Intern will also conduct limited additional field work at Indiana Dunes and Sleeping Bear Dunes National Lakeshore to characterize the physical and biological context of the species for subsequent modeling.
Duration:	2 - 6 months
Internship Location:	Chesterton, IN
Field(s) of Study:	Life Science
Applicable NSF Division:	EAR Earth Sciences, DBI Biological Infrastructure, DEB Environmental Biology
Intern Type Preference:	NSF-funded PhD student via the Graduate Student Preparedness Program (GSP)

- Keywords:** Endangered plants. metapopulation dynamics, Great Lakes sand dunes, dune succession, sand movement, Pitcher's thistle, *Cirsium pitcheri*, Indiana Dunes National Lakeshore
- Expected Outcome:** The goal of the work is to produce a model correlating changes in sand dune geomorphic form, Lake Michigan lake levels, vegetation cover and Pitcher's thistle patches spanning 1992-2015. We expect to publish our analyses of patch dynamics in a peer reviewed journal, and we will continue to update the model as we conduct repeat surveys in the future. The intern will gain experience with spatial analyses within the ArcGIS environment, as well as hands-on experience with field mapping techniques. Additionally, the intern will gain insight into information needs of land management agencies, invaluable in understanding how to translate scientific study into practical applications. The intern will have meet with National Park Service managers to understand the perspectives on endangered species management.
- Special skills/training Required:** We seek an individual that is knowledgeable in the use of GIS, spatial statistics, remote sensing analysis of vegetation and sand dunes, and enjoys occasional field work.
- Duties/Responsibilities:** The specific role of the intern will be to work with Drs. Noel B. Pavlovic and A. Kathryn McEachern to develop the work program for the duration of the internship. They will be housed at the Lake Michigan Ecological Research Station (LMERS) located in the lands of the Indiana Dunes National Lakeshore in Chesterton, Indiana. LMERS is located in oak forest on the 9,000 year old Calumet dune ridge, one mile south of Lake Michigan. The intern will be given all the historic spatial data regarding the distribution of Pitcher's thistle at Indiana Dunes, Sleeping Bear Dunes, and Pictured Rocks National Lakeshore for spatial analysis. They will gather appropriate imagery (photographs, aerial photographs, lidar) for creating disturbance maps and modeling Pitcher's thistle distribution in the landscape. If time permits, the intern will develop suitable landscape models and then examine patch connectivity in the context of local and long distance dispersal. The spatial analyses will form the basis for a paper to be written by the team.
-