



2021 Cooperative Summer Internship Program

USGS Project Scientist	Noel B. Pavlovic
Project start date	6/1/2021
Duration	The summer, say 10 to 11 weeks
Location	USGS station in Chesterton in the lands of Indiana Dunes National Park, or virtual if required by COVID-19
Type of Intern	GIS
Title of Project	Landscape Perspective in Conserving the Threatened Great Lakes Sand Dune Endemic, Pitcher's Thistle.
Background	The goal of this project is to put the conservation of the Federally threatened Pitcher's thistle (<i>Cirsium pitcheri</i>) into a quantitative ecological and landscape perspective through the development of quantitative GIS tools. Pitcher's thistle inhabits the coastal sand dunes of the western Great Lakes (Superior, Michigan and Huron) in Illinois, Indiana, Michigan and Wisconsin. More than 30 years of population demographic data from Indiana Dunes National Park (INDU), and Pictured Rocks and Sleeping Bear Dunes National Lakeshore coupled with periodic metapopulation data from the INDU will provide the background for the project. Population viability is intimately tied with coastal dune forming processes (wind, lake levels, storms etc.), open sand patch dynamics in open dune habitats (disturbance and succession), abundance of invasive species (plants and weevils) as well as genetic and other factors. We want to explore the integration of our ecological knowledge across spatial scales from the metapopulation, population, dune system, and range wide geological and ecological parameters into a comprehensive assessment of species viability and extinction risk.
Objectives	Objectives of the project are to: 1. Develop a GIS map of extant and extirpated occurrences of Pitcher's thistle in the Great Lakes with delineation of potential habitat. 2. Use remote sensed imagery with GIS applications to delineate the area of potential, suitable and occupied habitat in the landscape by occurrence. 3. Develop maps of habitat and dune types (foredune, secondary dunes, blowouts) in each landscape that incorporates probability of population loss and gain from shoreline fluctuations from lake level change. 4. Synthesize the multiple parameters describing occurrence conditions in the landscape to assess population viability.
Intern Tasks	The intern will work on data acquisition from state level and development of GIS databases for the project. This will involve use of ArcGIS, Imagine and other tools to create applied maps. They will be involved in discussions about the interactions among the important population viability factors in regard to local, regional and rangewide viability and whether we can evaluate extinction debt for this species. The intern will explore analysis of the quantitative population, habitat and dune system data for assessing viability and extinction probability.

Expected Results and Benefits to the Intern	We expect to make considerable advancement in developing landscape level tools for Pitcher's thistle conservation. The intern will apply GIS skills to real world issues in plant conservation. They will benefit from working in a rigorous research environment that interfaces between the USGS and the National Park Service.
Skills and Interests of Candidates	We seek someone who has ArcGIS skills with some experience with imagery analysis and habitat/landcover classification. Candidates should have an interest in conservation biology of plants, plant population biology and endangered species conservation.
Project Type	Office Work;
Project Discipline	Ecology;Modeling;General Geology;