



2021 Cooperative Summer Internship Program

USGS Project Scientist	Andy Royle	
Project start date		5/24/2021
Duration	12 weeks	
Location	Laurel MD	
Type of Intern	ESA	
Title of Project	Quantitative Turtle Analysis Project	
Background	Background: FWS Patuxent refuge has completed 2 years of box turtle studies using capture-recapture methods. This involves searching for turtles and physically marking them by notching their shells. Data on capture rates and locations provide information about population size, survival probabilities and habitat use. This is a labor intensive process and it requires a dedicated specialist to process turtles and mark them.	
Objectives	We are developing a new framework based on digital photography which is more efficient to implement and will allow non-specialists to collect useful data ("citizen science"). The key idea is based on using digital photographs of box turtles to determine individual identity (rather than physical marks) based on the spotting and coloration pattern of the box turtle carapace. Thus, anyone encountering a box turtle can simply snap a picture of its carapace and email it or upload it.	
Intern Tasks	To initiate this study in 2021 we require 1 or more student interns to engage in the following activities: (1) search for box turtles on Patuxent refuge. This will involve searching on bike or foot along prescribed search routes or transects; (2) encountered turtles will be physically marked using the old method and, in addition, digital photos will be obtained. Sampling for box turtles is most productive between July and September; (3) Determining methods for processing images and isolating characteristic patterns from the carapace of turtles. (4) Assembling and organizing historical data and images of turtles. (5) Development of simple summary statistics that characterize spot patterns. (6) Development of statistical models that predict turtle identity from observed summaries of patterns. ("machine learning")	
Expected Results and Benefits to the Intern	The intern will gain specific experience marking and processing turtles in the field, collecting field data, and computer processing of digital images and will have the opportunity to demonstrate independent thinking and creativity in the development of a novel identification system for box turtles.	
Skills and Interests of Candidates	field experience, GPS, working independently, computing skills, R programming environment, data processing, data analysis, GIS	
Project Type	Field Work;Office Work;	
Project Discipline	Ecology;Modeling;Wildlife Biology;	

