

## 2019 Cooperative Summer Field Training Program

● <b>Project Title:</b>	Population Study of Box Turtles on the Patuxent Refuge using Digital Image Processing and Machine Learning Concepts
● <b>Project Scientists:</b>	Andy Royle
● <b>USGS Center:</b>	Patuxent Wildlife Research Center
● <b>Location:</b>	Laurel MD

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### **Project Description:**

#### ***Background Information:***

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 2019 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 Outcomes:***

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.

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### **Details for Matching:**

**Type of Project:** Field Work, Office Work

**Project Discipline:** Ecology, Modeling, Wildlife Biology

**Project Start Date:** Fri Jun 01 2018 00:00:00 GMT-0400 (EDT)

**Project Duration:** 3 months

**Level of Physical Demand:** 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.

**GIS Training:** Any

**Special Skills and Interests:** computing skills, R programming environment, data processing, data analysis, image processing. GPS use.