

Annual Research Report: Blake-Nuttall Fund
Whip-poor-will Migratory Applied Research Project
Dr. Marja Bakermans (mbakermans@wpi.edu)
Worcester Polytechnic Institute

Summary: Using GPS technology, this project seeks to understand migratory pathways and connectivity between the wintering and breeding areas of Eastern Whip-poor-will (*Antrostomus vociferus*) populations. We lack information regarding key aspects of whip-poor-will life history including migratory pathways and connectivity between the wintering and breeding areas, which is required to develop a full life-cycle approach to the conservation of this declining species. A better understanding of migratory connectivity would allow us to target conservation and management actions by ensuring that breeding and wintering ground conservation efforts align. In summer 2018, we captured and affixed GPS tags on 27 whip-poor-wills at three locations in Massachusetts. We will target returned individuals in summer 2019, and we are currently seeking funds to expand our data collection in 2019.

Background

Eastern Whip-poor-will (*Antrostomus vociferus*) has been experiencing a 4.4% annual decline in New England and 6.6% in Massachusetts since 1966 (Sauer et al. 2017). Although distribution of whip-poor-wills ranges across the eastern United States, they are local breeders associated with mixed forests with little or no underbrush and interspersed clearings (Petersen and Meservey 2003, Cink et al. 2017). In Massachusetts, whip-poor-will distribution appears to be closely tied to forest-adapted pine-oak communities, and loss of this habitat has likely contributed to the dramatic retraction of their distribution and abundance (Massachusetts Division of Fisheries & Wildlife 2012, Akresh and King 2016). In fact, there are only six known sites in Massachusetts that support ≥ 20 breeding pairs (Massachusetts Division of Fisheries & Wildlife 2012). Even with excessive habitat loss, many ornithologists believe that suitable nesting habitat is available but unoccupied during the breeding season, leading researchers to speculate on additional causes of population decline (Cink et al. 2017).

Unfortunately, basic natural history and ecological information is still lacking for this species because whip-poor-wills are notoriously difficult to study due to their nocturnal behaviors and limited numbers (Petersen and Meservey 2003). The following priorities for future research that are relevant to this study include: fall migration departure dates, migration routes taken, habitat used along migration, wintering locations, and changes in migratory movements and timing in relation to seasonal temperatures (Cink et al. 2017). For example, it is hypothesized that some individuals remain farther north in mild winters (Cink et al. 2017), but it is not clear how far north this range may extend in southern states. An understanding of full life-

cycle events, like migratory timing, routes, behavior and wintering locations, would allow us to pinpoint threats and opportunities for conservation across the species' range.

The only study on whip-poor-will migration patterns and wintering connectivity was published last year. This study, by English et al. (2017), tracked 22 whip-poor-wills from four regions in Canada and found that wintering locations ranged from the Gulf of Mexico to Costa Rica. Interestingly, none of the birds wintered in the southern United States. In addition, they found evidence for leap-frog migration, where northern populations migrated to the southernmost wintering locations, and sex-differentiated migration, where females departed for fall migration later, took longer time for fall and spring migrations, and departed earlier from wintering grounds. Furthermore, migratory stopover times for all whip-poor-wills ranged up to 17 days in the Gulf of Mexico in the fall compared to limited stopover time in spring migration.

Goals and Objectives

The goals of this project are to use GPS technology to understand migratory pathways and connectivity between the wintering and breeding areas of Eastern Whip-poor-will populations. My objectives are twofold where I aim to 1) gain critical migratory ecology information specific to local Massachusetts populations and 2) examine differences in migratory connectivity of distinct breeding populations across a north-south and east-west continuum in the eastern United States. Collaboration with colleagues in Ohio will broaden understanding of whip-poor-will migratory and wintering movement ecology.

Field methods and Preliminary Results

Fieldwork was conducted from 16 May – 25 June 2018 with assistance from Dr. Andrew Vitz, State Ornithologist (Massachusetts Division of Fisheries and Wildlife), Jacob McCumber (Joint Base Cape Cod), two WPI undergraduate students (Josh Driscoll and Urmila Mallick), and one undergraduate student (Gates Dupont) from Cornell University. We used playback recordings (songs and calls) to lure territorial whip-poor-wills into mist-nets. Banding efforts were focused along an east-west gradient across Massachusetts at Joint Base Cape Cod, Bolton Flats Wildlife Management Area (WMA), and Montague Plains WMA (Figure 1). All locations represent pitch pine-scrub oak woodlands that whip-poor-wills are known to use as breeding grounds. Once captured, each bird was sexed and aged as either second-year (1st time breeder; SY) or after-second-year (ASY) birds, and basic morphological measurements were collected (e.g., mass, Pyle 1997). Subsequently, we attached a GPS tag (Lotek PinPoint 10) onto the bird's back using a leg-loop harness. After we released a tagged bird, we collected GPS coordinates of the capture location to aid in targeting those individuals for recapture in summer 2019. Funding provided by the Nuttall-Blake Fund allowed me to purchase 9 GPS tags.

We captured 32 eastern whip-poor-will individuals from 16 May – 25 June 2018 (Table 1). We placed GPS tags on 27 individuals across the state of Massachusetts among three locations (Table 2, Figure 1). We recaptured 7 (of 26; 27%) individuals that were banded in summer 2017 during a pilot study (2 females, 5 males; Table 1). In addition, throughout the summer banding period we had 14 recapture events of 11 individuals. On average, females had smaller wing chord (154.6 cm, 1.9 SE) compared to males (159.0 cm, 0.9 SE) and females had greater mass (53.6 g, 2.3 SE) compared to males (52.1 g, 1.0 SE).

Future work

In summer 2019, we will expand banding efforts at the 2018 sites to recapture birds that we tagged in 2018. In addition, we hope to increase our sample size and deploy an additional 20-30 GPS tags. Because studies that use GPS data loggers rely on returned individuals, large sample sizes are critical to the success of the project.

Implications

Research on migratory and wintering ecology is needed for this species in order to begin to develop full life-cycle conservation plans. This species is of particular interest here in the state of Massachusetts, where it was listed as **a Species of Special Concern** under the Massachusetts Endangered Species Act in 2011 and is included in the State Wildlife Action Plan (SWAP). Throughout its breeding range, it is considered a **Species of Greatest Conservation Need** by Migratory Bird Joint Ventures (<http://mbjv.org/>) and is a species at risk of extinction without significant action (North American Bird Conservation Initiative 2016). As such, state and local agencies are actively promoting the conservation of this species, and the information from this project will assist that effort. Increasing conservation efforts directed toward whip-poor-wills and their habitats will benefit an entire suite of wildlife that depend on young forest habitat and increase biodiversity across the landscape, which is critical to building healthy ecosystems. Collaborating with local partners and the Ohio group will allow us to produce a larger, more meaningful study that can address critical conservation measures for the species.

Table 1. Summary of whip-poor-will individuals captured or returned (i.e., first captured in summer 2017 in a pilot study) across Massachusetts by age and sex, summer 2018. Note that birds were not captured at Montague Plains WMA in 2017.

Location	Total no. individuals	New captures (2018)				No. returned			
		Age		Sex		Age (2017)		Sex	
		SY	ASY	M	F	SY	ASY	M	F
Joint Base Cape Cod (eastern)	9	5	3	5	3	0	1	1	0
Bolton Flats WMA (central)	17	9	2	9	2	3	3	4	2
Montague Plains WMA (western)	6	3	3	6	0				

Table 2. Summary, by age and sex, of whip-poor-wills captured that received GPS tags, summer 2018.

Location	Total	Number of GPS tags deployed (2018)			
		Age		Sex	
		SY	ASY	M	F
Joint Base Cape Cod	7	3	4	5	2
Bolton Flats WMA	14	8	6	10	4
Montague Plains WMA	6	3	3	6	0

Figure 1. Location of study sites where banding and GPS deployment efforts took place for whip-poor-wills in summer 2018.

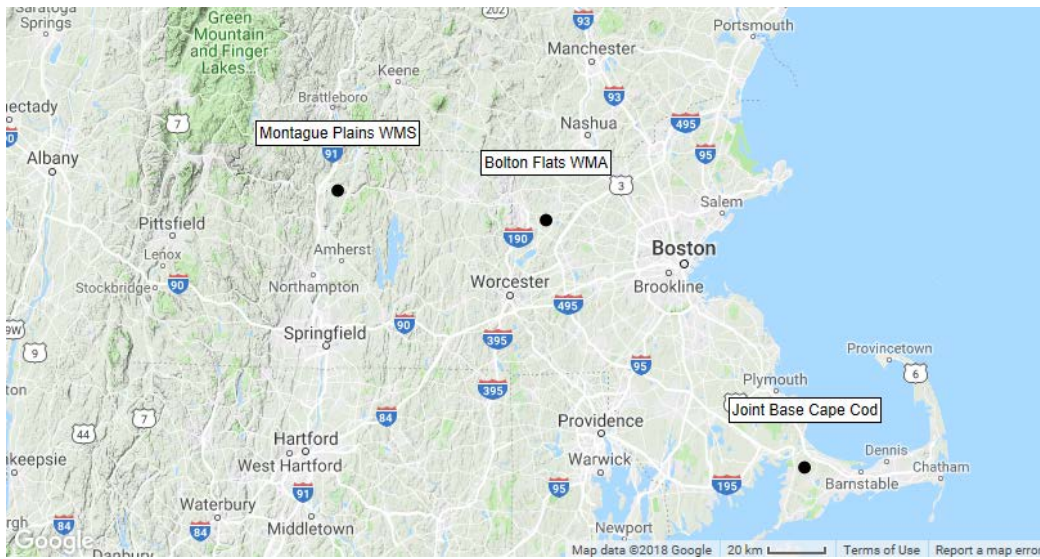


Figure 2. Male eastern whip-poor-will caught at Bolton Flats WMA, May 2018. The thin GPS antenna can be seen emerging from the back feathers.



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