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### **Title**

The Ecology and Conservation of the Eastern Spadefoot (*Scaphiopus holbrooki*) in the Province Lands of Cape Cod National Seashore, U.S.A.

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Wildlife & Fisheries Conservation

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### **Abstract**

The eastern spadefoot (*Scaphiopus holbrooki*) is an ephemeral wetland breeding amphibian that ranges from southern Florida north and westward to southeastern Missouri and northward along the Atlantic coastal plain to Massachusetts. This species is listed as either "threatened" or "endangered" in the four states (Connecticut, Massachusetts, New York, and Rhode Island) in the northeastern United States where it is known to exist. Population declines and extirpations throughout the region over the past century have been documented and are largely believed to be the result of habitat loss and/or alteration.

Very limited empirical results exist on many life history attributes of *S. holbrooki* anywhere in its range, including movement patterns, upland habitat selection, and breeding habitat preferences. These are critical information gaps that must be filled in order to effectively conserve and manage for this rare species in the northeastern U.S. While *S. holbrooki* is extremely rare throughout most of the Northeast, it is locally common in specific areas of Cape Cod National Seashore, most notably in an extensive sand-dune ecosystem known as the Province Lands located at the northern terminus of the Cape Cod peninsula.

During 2005 and 2006, we conducted larval trapping surveys at 102 wetlands in the Province Lands primarily to: 1) identify breeding wetlands and 2) to assess breeding habitat use and preferences of *S. holbrooki* with respect to a suite of selected abiotic and biotic covariates. We captured *S. holbrooki* larvae at 140/652 (~21.5%) trap locations and 41/102 (~40.2%) wetlands sampled. Model results identified a number of additional habitat covariates that exhibited a statistically significant relationship with larval *S. holbrooki* abundance including: the percent cover of 1) cranberry (positive relationship), and 2) woody shrub (positive relationship) at a 4m radius from the trap location; 3) percent woody shrub cover at the wetland-scale (negative relationship); 4) percent canopy cover at the wetland-scale (positive relationship); 5) wetland pH (positive relationship); 6) distance to the closest paved road (positive relationship); and the kernel density cover of 7) deciduous shrubland edge (positive relationship), 8) deciduous shrubland (negative relationship), 9) pine (positive relationship), and 10) open dune (positive relationship) in the uplands surrounding the study wetlands.

During 2006 and 2008 we radio-tracked adult *S. holbrooki* in the Province Lands using surgically implanted radio-transmitters to: 1) describe movement patterns and estimate home range sizes, and 2) assess upland habitat preferences of *S. holbrooki*. We tracked 19/20 individuals (11 males and 8 females) and 12/20 individuals (7 males and 5 females) for at least the first 30 and 100 days post-surgery, respectively, during 2006. During 2008 we successfully tracked 15/25 individuals (10 males and 5 females) and 5/25 individuals (3 males and 2 females) for at least the first 30 and 100 days post-surgery, respectively. In addition to results obtained on a suite of movement attributes

we identified a number of upland habitat preferences for *S. holbrookii*. Use locations were: 1) closer to the nearest deciduous shrub edge, 2) had a greater percent cover of ground-running pitch pine branches at a 1 m scale, 3) had a greater percent cover of deciduous shrubs at a 1 m scale, and 4) had a greater percent cover of reindeer lichen at a 5 m scale.

Results from this research provide much needed empirical results on these critical life history attributes related to the movement and breeding ecology of *S. holbrookii*. These results will aid biologists and Park management staff at Cape Cod National Seashore in more effectively employing conservation and management strategies aimed at enhancing the long-term persistence probability of this regionally rare species in the Province Lands.

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