



North Stonington Solar Facility

Biological and Habitat Assessment to Inform Potential Project Impacts to the State Endangered Eastern Spadefoot (*Scaphiopus holbrookii*) and other State Listed Amphibians and Reptiles

North Stonington, Connecticut

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Background:

The Eastern Spadefoot (Scaphiopus holbrookii)

The eastern spadefoot is the only member of the spadefoot family (Scaphiopodidae) east of the Mississippi River, is among the rarest amphibians in the northeastern United States. It is listed as Endangered under Connecticut's Endangered Species Act and designated as Most Important in Connecticut's Wildlife Action Plan for Species of Greatest Conservation Need (CT DEEP 2015). New England populations are scattered and disjunct, and typically found in low elevation river valleys with sandy, well-drained soils. Some of these already localized populations have been extirpated, presumably related to urban/suburban development (Klemens 1993). These extirpations likely resulted from impacts to their breeding pools, which are often not afforded wetland protection status due to their highly ephemeral nature and difficulty in detecting breeding activity of spadefoots. In eastern Connecticut spadefoot locations coincides with Hinckley Soils and elevations below 200 feet with two notable exceptions in the towns of Lisbon and Griswold where

elevations are greater than 300 feet (Moran and Button 2011, Klemens 1993, D. Quinn, observations, 2016). Hinckley soils are sandy, gravelly, and well drained (NRCS, 2008), characteristics that are consistent with reports of soil types preferred by spadefoots.

Data on the movement patterns and habitat use/selection of spadefoots in the Northeast are sparse with a few exceptions, most notably Ryan *et al.* (*in preparation*) and Timm *et al.* (2014). Timm *et al.* (2014), found individuals selecting areas closer to deciduous shrub edges and areas with greater percent cover of low growing shrub species. Similar trends in habitat selection were found by Ryan *et al.* (*in prep*), with burrow locations in, or at the edge of, open-canopy cover types with open soils and nearby patches of dense vegetation having soil temperatures warmer than those of randomly selected locations nearby. Timm *et al.* (2014), attributes habitat preferences to individuals seeking out locations that provide suitable burrowing substrates, cool and moist subterranean conditions, ample prey availability and protection from predators during nighttime foraging forays.

Methods:

Presence/Absence was determined through Nocturnal Visual Encounter Surveys (nVES) using eye-shine methodologies conducted over fifteen nights during optimal surveying conditions (rainy evenings with temperatures at about a minimum of 50 degrees Fahrenheit). All surveys and activities associated with the study were performed under Permit No. 1317004, unless otherwise noted. A team of three to four individuals conducted nVES's using 1,000 lumen high-output LED headlamps in habitats optimal for locating spadefoots, focusing primarily along ecological edges, within early/late successional habitats, scarified sandy habitats and in forested habitat with sparsely vegetated understory. Although surveys were focused within optimal habitats, surveys were conducted throughout the property limits in a variety of habitats, including wetlands. Visual encounter surveys typically began 15 minutes prior to sunset and continued until a drop-off in activity was determined through a reduction in amphibian detection rates.

Although a radio-telemetry study was designed to determine population movement patterns and site-specific habitat use, no eastern spadefoots were captured to implement this study (Permit Number: 2122005).

Diurnal Visual Encounter and Cover Object surveys were conducted to detect any additional state listed amphibian or reptiles. A total of 8 artificial coverboards were dispersed along the periphery of the open sandy habitat in the southern portion of the subject property.

Results:

Nocturnal Visual Encounter Surveys were conducted on 16 nights between May 17th and September 2nd, 2021 (Table 1). A total of 41 hours (172-man hours) were spent conducting nVES's (Table 1). Although no eastern spadefoots were detected during nocturnal survey efforts, suitable habitat for this species was observed. The southern section of the property contained characteristic upland habitat for the eastern spadefoot with a mix of sparsely vegetated warm

season grasses, mixed herbaceous flowering plants, low growing woody shrub species, and forested edge habitats. Three potential breeding pools were also identified within the sand and gravel habitat in the southern portion of the subject property.

Although no spadefoots were documented breeding at the subject property, the 2021 field season was a banner year for eastern spadefoot breeding activity across their Connecticut range. Breeding events were confirmed on three separate occasions on June 1st, July 9th, and September 2nd in the towns of Canterbury, North Stonington, Lisbon, and Plainfield. These breeding events were triggered by heavy rains on May 31st with accumulations of 2.68", followed by Tropical Storm Elsa on July 9, with accumulations of 3.97" and Hurricane Ida on September 1 with accumulations of 7.5" of rain. Accumulation levels were recorded from a rain gauge located approximately 0.75 miles southwest of the subject property.

During nVES's a diverse assemblage of commonly encountered and widely distributed amphibians and reptiles were observed (Table 2).

Diurnal surveys were conducted on September 4th, 13th and 16th, 2021 totaling 24 survey hours. Although no additional listed species were detected during our late summer/early fall efforts, surveys conducted by George Logan of REMA Ecological Services, LLC between 2017 and 2020 documented one eastern box turtle, one spotted turtle and one ribbonsnake on the subject property (Table 2).

Table 1. Nocturnal Visual Encounter Survey Efforts

Date	Survey Hours	No. of Surveyors	Total Man Hours	Spadefoots Activity North Stonington	Breeding Activity Quinebaug Valley
5/17/2021	4.5	4	18	No	No
5/27/2021	5	3	15	No	No
5/28/2021	5	4	20	No	No
5/31/2021	4	3	12	No	No
6/1/2021	4	3	12	Yes	Yes (Amplexus)
6/2/2021	4.5	2	9	Yes	Yes (Amplexus)
6/3/2021	5	3	15	Yes	No
6/4/2021	4.5	2	9	Yes	No
6/14/2021	4.5	2	9	Yes	No
6/22/2021	4	3	12	Yes	Yes (Calling Only)
6/30/2021	4	2	8	Yes	No
7/1/2021	3.5	2	7	Yes	No
7/2/2021	3	2	6	Yes	No
7/9/2021	4	2	8	Yes	No
8/19/2021	4	2	8	Yes	Yes (Amplexus)
9/2/2021	2	2	4	Yes	Yes (Amplexus)
Total		41	172		

Table 2. Comprehensive List of Amphibians and Reptiles Documented During Field Survey Efforts

<i>Ambystoma maculatum</i>	Spotted Salamander
<i>Plethodon cinereus</i>	Eastern Red-backed Salamander
<i>Bufo americanus</i>	American Toad
<i>Hyla versicolor</i>	Gray Treefrog
<i>Rana catesbeiana</i>	American Bullfrog
<i>Rana clamitans</i>	Green Frog
<i>Rana palustris</i>	Pickerel Frog
<i>Rana sylvatica</i>	Wood Frog
<i>Pseudacris crucifer</i>	Spring Peeper
<i>Chelydra serpentina</i>	Snapping Turtle
<i>Chrysemys picta</i>	Painted Turtle
<i>Clemmys guttata*</i>	Spotted Turtle
<i>Terrapene carolina Carolina*</i>	Eastern Box Turtle
<i>Coluber constrictor constrictor</i>	Northern Black Racer
<i>Diadophis punctatus edwardsii</i>	Northern Ring-necked Snake
<i>Nerodia sipedon sipedon</i>	Northern Watersnake
<i>Pantherophis alleghaniensis</i>	Eastern Ratsnake
<i>Thamnophis saurita saurita*</i>	Ribbonsnake
<i>Thamnophis sirtalis sirtalis</i>	Eastern Gartersnake

*Species documented by surveys conducted by George Logan of REMA Ecological Services, LLC

Recommended Habitat Enhancements:

Although no eastern spadefoots were detected on the subject property, suitable habitat for this species was observed including potential breeding pools and unplan habitats. The scarified sand and gravel habitat in the southern portion of the subject property affords great opportunity for habitat restoration. Much of the old sand and gravel extraction area has become inundated with invasive plant species over the years, namely autumn olive (*Elaeagnus umbellate*) and multiflora rose (*Rosa multiflora*). This inundation has greatly reduced the availability of suitable scarified early/late successional habitat. The southern portion of the property also contains a mosaic of forest and wetland habitat types. Both the spotted turtle and ribbonsnake documented by George Logan were observed within the wetlands to the west and southwest of the sand and gravel habitat. **Removing the invasive shrub species within the southern portion of the property** will create early successional habitat and enhance the habitat connections between the wetland, forest and early successional mosaic. Invasive shrub species should be monitored and removed every five years to prevent the re-establishment of invasive shrubs. This habitat enhancement will benefit the eastern box turtle and spotted turtle and will maintain the suitability of this habitat for eastern spadefoots, if over time, this area is colonized by spadefoots which currently occur in close proximity to this site.

Recommended Species Protection Measures:

Construction Protection Measures:

1. Isolation Measures & Erosion and Sedimentation Controls

- a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals. These products or reinforced silt fence should not be used on the project site. Temporary erosion control products, either erosion control blankets, fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) and/or netting composed of planar woven natural biodegradable fiber should be used to avoid/minimize wildlife entanglement.
- b. Installation of exclusionary fencing (i.e., construction grade silt fencing), should be installed as barrier to migrating/dispersing herpetofauna.
- c. The intent of the barrier is to isolate the majority of the work zone from foraging/migrating/dispersing herpetofauna. Oftentimes complete isolation of a work zone is not feasible due to accessibility needs. In this circumstance all openings in the isolation barrier, used during the workday for accessibility, should be closed with temporary silt fencing backed with hay bales at the completion of each day.
- d. The fencing should consist of non-reinforced conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten-foot intervals using four-foot oak stakes or approved equivalent. In areas where the silt fence cannot be buried, the fencing should be placed with the unburied flap facing away from the constriction area and covered with six inches of crushed stone. The Contractor is responsible for daily inspections of the fencing for tears or breeches in the fabric and accumulation levels of sediment, particularly following storm events of 0.25 inch or greater. All compromised areas of silt fence must be immediately repaired.

A qualified herpetologist should conduct an initial fence inspection after installation and follow-up inspections on a weekly basis. The extent of the barrier fencing should be as shown on the site plans. The Contractor should have available additional barrier fencing should field conditions warrant extending the fencing as directed by the herpetologist.

- e. Listed species sweeps should be conducted by a qualified herpetologist prior to the commencement of any clearing activities inside the exclusionary areas. This will be especially important to ensure no eastern box turtles are impacted during clearing/construction activities. If clearing activities are scheduled to commence during the inactive season for eastern box turtles (approx. October 15th through April 15th), these sweeps must occur prior to September 15th.

f. No equipment, vehicles or construction materials should be stored outside of the exclusionary barrier fencing.

g. All silt fencing shall be removed within 30 days of completion of work and permanent stabilization of site soils.

2. Contractor Education

a. Prior to work on site, the Contractor shall attend an educational session at the preconstruction meeting with a qualified herpetologist. This orientation and educational session will consist of an introductory meeting providing photos of herpetofauna that may be encountered during construction activities, specifically state-listed amphibian, and reptile species.

b. The education session will also focus on means to discriminate between the species of concern and other native species to avoid unnecessary "false alarms". Encounters with all species will be documented.

c. The Contractor will be provided with cell phone and email contacts of the herpetologist to immediately report any encounters with listed species, or other herpetofauna species. Educational poster materials will be provided and must be displayed on the job site to maintain worker awareness as the project progresses.

4. Reporting

a. Following completion of the construction project, a summary report to the CTDEEP documenting the monitoring and maintenance of the barrier fence and erosion control measures should be completed.

b. Any observations of state listed species will be reported to CTDEEP by the herpetologist with photo-documentation (if possible) and with specific information on the location and disposition of the animal. Any encounters with amphibians or reptiles should be immediately reported to the herpetologist.

Literature Cited:

- CT DEEP 2015. Connecticut Species of Greatest Conservation Need: Wildlife Action Plan. State of Connecticut Department of Environmental Protection, Bureau of Natural Resources.
- Klemens, M. W. 1993. Amphibians and reptiles of Connecticut and adjacent regions. State Geological and Natural History Survey of Connecticut, Bulletin No. 112. Connecticut Department of Environmental Protection, USA.
- Moran, M. and C. E. Button. (2011). A GIS model for identifying eastern spadefoot toad (*Scaphiopus holbrookii*) habitat in eastern Connecticut. *Applied Geography* 31 (2011) 980-989.
- Ryan, K. J., D. P. Quinn, and A. J. K. Calhoun. (In Prep.) Movement Patterns and Terrestrial Habitat Selection of Eastern Spadefoots (*Scaphiopus holbrookii*) at the Northern Limit of Their Range.
- Timm, B. C., K. McGarigal, and R. P. Cook. (2014). Upland movement patterns and habitat selection of adult Eastern Spadefoots (*Scaphiopus holbrookii*) at Cape Cod National Seashore. *Journal of Herpetology* 48:84–97.