

NOTES ON HABITAT USE AND OVIPOSITION IN *SPHAGNIANA SPHAGNORUM* AT MARS HILL WILDLIFE MANAGEMENT AREA IN SOUTHEAST MANITOBA

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The main range of *S. sphagnorum* (Walker, 1869), a native shield-backed katydid (Tettigoniidae), extends from western Québec to western Northwest Territories and eastern British Columbia.¹ *S. sphagnorum* has long been considered endemic to Canada; however, this species has recently been documented in northern Minnesota, representing the first records south of the Canadian border.²⁻⁴ The conservation status of *S. sphagnorum* in Manitoba is S4S5, or “apparently secure”.⁵

The insect order Orthoptera is comprised of grasshoppers, katydids, crickets and other related insects. Members of the suborder Ensifera are variously known as katydids, long-horned grasshoppers, true crickets or bush crickets, depending on location. The shield-backed katydids of the subfamily Tettigoniinae are so named for their shieldlike pronotum and are widely distributed across North America. Many species are predaceous to a lesser or greater degree.

S. sphagnorum is small to medium in size and mainly brown, its saddle-like pronotum broad, elongated and widening rearward. The lower margin of the dark pronotal disc is yellow to green. A row of black spots appear laterally along the abdomen and the rear margin of each segment is green. All tibiae are green. The ovipositor is upward-curving and swordlike. Both sexes may be macropterous (long-winged) or brachypterous (short-winged). *S. sphagnorum* occurs on the ground, in grasses and in shrubs and trees. Male *S. sphagnorum* have a unique, two-part calling song that steadily alternates between two intensities; these songs are useful in species' detection and identification (east of Manitoba, the Slender Meadow Katydid (*Coccocephalus fasciatus*) is the only tettigoniid species to occur with *S. sphagnorum* in boggy habitats).⁶

Previously documented habitats of

S. sphagnorum include bogs and open, grassy areas.^{7,8} My field observations of *S. sphagnorum* (supported by records from “citizen-science” internet platforms such as iNaturalist) indicate additional habitat associations. In southeastern Manitoba, this includes predominantly dry coniferous forest. One such location is Mars Hill Wildlife Management Area (WMA), where brachypterous females were observed to deposit their eggs shallowly in sandy soil.

Mars Hill WMA is located approximately 69 km northeast of Winnipeg in mixed boreal forest of the Boreal Plains Ecozone.^{9,10} The study site is located within mossy, open Jack Pine (*Pinus banksiana*) forest, where the understory vegetation includes woody and herbaceous plants such as chokecherry (*Prunus virginiana*), pin cherry (*Prunus pennsylvanica*), saskatoon (*Amelanchier alnifolia*), blueberry (*Vaccinium* sp), common bearberry (*Arctostaphylos uva-ursi*), eastern teaberry (*Gaultheria procumbens*) and Canada mayflower (*Maianthemum canadense*), among others. Small, grassy openings occur at irregular intervals.

Informal surveys of Orthoptera held on 13 August 2013 and 12 September 2023 each produced one gravid female *S. sphagnorum*. Weather conditions were similar on each day, i.e. mainly sunny with light wind (<15 km/h) and temperatures

between 17 and 21 °C.¹¹ Both *S. sphagnorum* were located in the afternoon (12:43 h and 13:58 h), initially on bare substrate within the forest stand, or on ground cover. In each case, the female oviposited in nearby tracks made by the passage of all-terrain vehicles (ATVs).

Based on extended observations of the latter female (1.5 hours), the location of oviposition on the open sand of the two-track was apparently randomly selected. The ovipositor was manipulated half-way into the soil and if the condition was adequate, the egg-laying continued for 20 minutes. The female remained largely immobile during this period. Afterward, concealment of the opening was limited to the settling of sand grains resulting from the withdrawal of the ovipositor (this was also the case with the former female). A marker placed to identify the relative position of the eggs was disturbed so that no data were obtained as to the number laid or how deeply they were deposited, but based on photographs taken in situ, the latter was estimated to be at a maximum depth of 1.5 cm. Observations of oviposition by the former female, though abbreviated, also indicated shallow egg deposition.

Insects that cannot self-regulate body temperature (ectotherms) depend on external heat sources to reach and



FIGURE 1. All terrain vehicle tracks in Jack Pine forest at Mars Hill Wildlife Management Area—a preferred oviposition site for *S. sphagnorum*.



FIGURE 2. *S. sphagnorum* ovipositing.

maintain a preferred body temperature (that at which they can most efficiently forage and breed). Basking, or “sun bathing”, on fully insolated soil in times of low ambient temperature, e.g. early or late in the day/season or under light cloud cover, and on vegetation when ambient temperatures are warmer, is a process known as thermoregulation.¹² Basking accounted for more than 70 per cent of the latter katydid’s activities during the survey period and was undertaken immediately pre- and post-oviposition on fully insolated soil, as well as briefly atop recumbent vegetation. Feeding by the female was limited to the consumption of a small weed head. The diet niche breadth of *S. sphagnorum* is unknown; Glenn Morris (pers. comm.) indicates Three-leaf Solomon’s Seal (*Maianthemum trifolium*) as a favoured food plant in northern Ontario bogs, and in captivity.

This plant was not recorded at the Mars Hill WMA site, nor at any other sites in southeast Manitoba where I have found *S. sphagnorum*; however, the wide availability of Canada Mayflower (*Maianthemum canadense*) in the region may present a common food source for adults and nymphs. My observations of the katydid concluded with the its departure into the forest understory.

Co-occurring orthopterans at Mars Hill WMA include *Melanoplus dawsoni*, *M. fasciatus*, *M. huroni*, *Pseudochorthippus curtipennis*, *Chloealtis abdominalis*, *C. conspersa* and *Gryllus pennsylvanicus*.

The fitness of insect eggs and subsequent offspring is dependent on the mother’s choice of oviposition site, which provides them with shelter and access to food sources. Subsurface oviposition is practiced by many orthopterans, whose eggs develop in a favourable microclimate, and are protected from parasites,

parasitoids and predators (for orthopterans these may include parasitic wasps, carabid beetles, crickets and arachnids, as well as birds).¹³ It is unclear whether egg deposition in sandy soil is a common behaviour in *S. sphagnorum*; certainly a more obvious and perhaps common choice of substrate for *S. sphagnorum* eggs is bog sphagnum moss, as recorded by GM in northern Ontario, or under spruce (*Picea* sp) bark (personal comment). It is interesting to note that unlike other tettigoniids, *S. sphagnorum* eggs have a uniformly black chorion, the function of which may be to promote radiative heat movement (GM, pers. comm.).

With the exception of studies on aspects of male calling song, male interaction and morphological adaptations, little has been published on the biology of *S. sphagnorum*.¹⁴⁻¹⁷ The information herein is presented as a contribution to our increasing understanding of this enigmatic, and adaptable, northern katydid.

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