



Synonyms: *Flexamia reflexus* (Osborn & Ball), *Deltocephalus reflexus* (DeLong)

Status: State threatened

Global and state rank: GNR (Globally Not Ranked) / S1 (State Critically Imperiled)

Family: Cicadellidae (typical leafhoppers)

Range: This species is known from Florida and Texas in the south, north to southern Wisconsin and Michigan and east to Maryland. The core of the range appears to be northern Illinois and Indiana, and southern Wisconsin and Michigan (Bess 2005).

State distribution: In Michigan, this leafhopper is currently known from 8 sites in six counties in the Lower Peninsula, mostly in the southeastern portion of the state. However, this species has not been systematically surveyed for and may occur in additional counties in which suitable habitat is available.

Recognition: The reflexed Indiangrass leafhopper measures 3-4 mm (0.2 inches) in length and is

named for the whitish, reflexed veinlets with dark brown margins (DeLong 1937, Bess 2005). The body is ivory white to light tan ventrally in color, with the dorsal portion of the abdomen being a darker tan or brown. The upper half of the face is blackish, with the lower half ivory white (Bess 2005). The reflexed Indiangrass leafhopper is superficially identical to a few other *Flexamia* species. The adults of these different species can only be reliably distinguished by their male genitalia. Therefore, the only way to positively identify the reflexed leafhopper is to collect specimens (preferably males as females are impossible to identify) and have them verified by an expert.

Best survey time: The best time to survey for adults in Michigan is from mid-August through early October. Adults are best sampled with the use of a sweep net. Several sweep samples may be needed to detect adults of this species in an area. Dew should be off the grass and the wind light or calm when surveys are conducted.

Habitat: This species is typically associated with high-quality, mesic prairie remnants where Indian-grass (*Sorghastrum nutans*) is a dominant species



(Bess 2005). Indiangrass is the reported larval food plant for this species, and occurs in many other Michigan natural communities as well, including lakeplain prairies, prairie fens, oak openings, dry sand prairies and barrens. These additional natural communities should be searched for the leafhopper. The grass also occurs in more anthropogenically disturbed habitats, including in cultivation and in restoration plantings.

Additional characteristic plants in the more mesic habitats include grasses such as big bluestem (*Andropogon gerardi*), Canada bluejoint (*Calamagrostis canadensis*), Junegrass (*Kohleria cristata*), panic grasses (*Panicum* spp.), little bluestem (*Schizachyrium scoparium*), and cordgrass (*Spartina pectinata*). Characteristic forbs include heath aster (*Symphyotrichum ericoides*), smooth blue aster (*S. laeve*), tickseeds (*Coreopsis* spp.), flowering spurge (*Euphorbia corollata*), downy sunflower (*Helianthus mollis*), marsh blazing star (*Liatris spicata*), mountain mint (*Pycnanthemum virginicum*), stiff goldenrod (*Solidago rigida*) and culver's root (*Veronicastrum virginicum*).

Some of these prairie habitats can be quite marly and trend towards prairie fen. Characteristic plants of these calcium and magnesium rich habitats include many of those found in tallgrass prairie, but with a greater representation by calciphilic sedges (e.g. *Carex sterilis*, *C. buxbaumii*, *C. lasiocarpa*), other genera of the sedge family (*Eleocharis*, *Rhynchospora*, *Scleria*, and *Scirpus* (*sensu lato*)), rushes (*Juncus*) and wetland grasses like marsh timothy (*Muhlenbergia glomerata*). In sites containing *Flexamia reflexa*, big bluestem and little bluestem are also important. Characteristic forbs include tuberous Indian plantain (*Arnoglossum plantagineum*), swamp thistle (*Cirsium muticum*), fringed gentians (*Gentianopsis crinita* and *G. virgata*), giant sunflower (*Helianthus giganteus*), Kalm's lobelia (*Lobelia kalmii*), shrubby cinquifol (*Dasiphora fruticosa*), Riddell's goldenrod (*Solidago riddellii*) and valerian (*Valeriana edulis*).

On sandy sites, the herbaceous vegetation is typ-

ically dominated by several sedges (*Carex longii*, *C. muehlenbergii*, *C. pensylvanica*, etc.) and short grasses such as three-awn (*Aristida* spp.), poverty oatgrass (*Danthonia spicata*), Junegrass, numerous panic grasses and little bluestem. Tall grasses like big bluestem and Indiangrass are somewhat more local, but still frequent, especially in depressions. Butterfly weed (*Asclepias tuberosa*), green milkweed (*A. hirtella*), bastard toadflax (*Commandra umbellata*), flowering spurge, wild strawberry (*Fragaria virginica*), prairie sunflowers (*Helianthus mollis*, *H. occidentalis*), bushclover (*Lespedeza capitata*), puccoon (*Lithospermum canescens*), rough blazingstar (*Liatris aspera*), lupine (*Lupinus perennis*), downy phlox (*Phlox pilosa*), bracken fern (*Pteridium aquilinum*), showy goldenrod (*S. speciosa*), goat's rue (*Tephrosia virginica*), blueberries (*Vaccinium* spp.) and violets (*Viola lanceolata*, *V. pedata*) are characteristic forbs.

Biology: Reflexed Indiangrass leafhopper adults can live up to three months, during which they mate and females lay eggs in tissues of the larval food plant. The adults feed by sucking fluids from the xylem tubes in leaf veins of their food plants. In the Hoosier National Forest in Indiana, adults are typically gone by mid-November (J. Bess, pers. obs.). The eggs hatch in the spring following first greenup of Indiangrass. It is presumed that the newly emerged nymphs actively seek out fresh sprouts, where they immediately begin to feed.

Reflexed Indiangrass leafhopper is generally regarded as rare and highly local in occurrence. Given its specific food plant requirements, this leafhopper rarely (if ever) leaves the mesic native grasslands where Indiangrass abounds. The adults are rather sedentary, typically moving carefully among plants. The females lay numerous small eggs (200+ reported in the literature for related taxa, Beanland et al. 2005) and probably disperse over a small area during the course of their lifetime (Bess 2005). This leafhopper is not known to migrate and females are functionally flightless because of their extended, egg-filled abdomens. However, several leafhoppers are known to become



active at and just before dusk, often rising into the upper herbaceous layer and undergoing mass flights above the vegetation (Lessio and Alberto 2004; Larsen and Whalon 1987). This is thought to either aid dispersal to new habitats or increase mating success. On hot, humid days, *Flexamia reflexa* can be locally common in the upper layers of vegetation around dusk. This may be preparation for mating flights as documented in other leafhopper taxa (Bess 2005).

Conservation/management: The most likely threat to this species is habitat loss and alteration. For example, agricultural, commercial and residential developments have resulted in the destruction or alteration of numerous prairies in the state. Given that this species has been recorded from so few sites in Michigan and across its range, all known populations should be protected at this time. Maintaining the ecological integrity of the habitat is important for the continued survival of this species at a site.

Research needs: A systematic survey is needed to identify additional occupied sites and to determine this species' true conservation status and distribution in the state. Known sites should be periodically (every 2-3 years) revisited and monitored. Information on the life history and ecology of the reflexed Indiangrass leafhopper is crucial to better understand its ecological requirements and to assess the potential for impacts on this species from various land use and management activities. Research should particularly focus on the identification, biology and habitat requirements of the immature stages (nymphs).

Determining the maximum distance that individuals will move between remnants and the proper size, composition and location of dispersal corridors necessary for continued survival are key areas of future research on this and other rare insect species (Bess 2005).

Related abstracts: Lakeplain wet-mesic prairie, lakeplain wet prairie, mesic prairie, prairie fen

Selected references

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Abstract citation

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