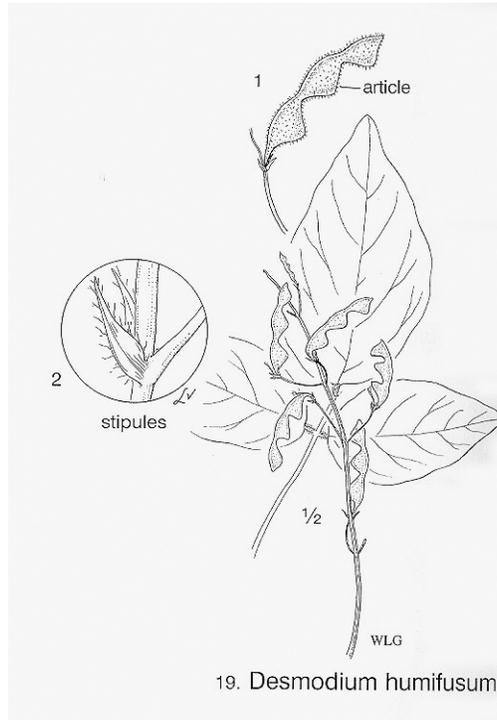


***Conservation Assessment
for
Trailing tick-trefoil (*Desmodium humifusum*)***



*The Illustrated Companion to Gleason and Cronquist's Manual:
Illustrations of the Vascular Plants of Northeastern United States and Adjacent Canada
Noel H. Holmgren, 1998*

USDA Forest Service, Eastern Region

Date 9/30/04

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This Conservation Assessment was prepared to compile the published and unpublished information on the subject taxon or community; or this document was prepared by another organization and provides information to serve as a Conservation Assessment for the Eastern Region of the Forest Service. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject taxon, please contact the Eastern Region of the Forest Service - Threatened and Endangered Species Program at 626 East Wisconsin Avenue, Milwaukee, Wisconsin 53203.

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EXECUTIVE SUMMARY

Trailing tick-trefoil, *Desmodium humifusum*, is an herbaceous perennial that spreads via trailing stems. It is found in open, sunny woods with sandy acidic soils that formed on chert or sandstone. It is an infrequently collected species. Its entire known current and historical global distribution covers nine states, mostly in the northeast, with disjunct occurrences in Indiana and Missouri. It has been extirpated in several states. It is ranked G1G2Q and has recently been demonstrated to be a hybrid of two common *Desmodium* species, based on biochemical and morphological traits.

The single known occurrence on a National Forest (and the only known locality in Indiana) is on the Hoosier National Forest. Of the few documented extant populations in other states, several are on protected sites.

Trailing tick-trefoil may benefit from burning. The single known site on the Hoosier National Forest is at risk from understory shading and from competition with Crown vetch, an invasive exotic species.

Hybrids between non-listed species cannot receive federal listing, no matter how rare they are, if the paternal species are not rare. Those who have worked with *Desmodium humifusum* recognize it as a very rare, distinct taxon and feel it should continue to have some protected status.

ACKNOWLEDGEMENTS

I would like to thank Science Librarian Barb Howes at Butler University for tireless assistance with references, Marcia Moore, Herbarium Assistant for help in all things and Butler student Kathy Fidler for research and clerical assistance. I am grateful to Kirk Larson, Botanist, on the Hoosier National Forest, and to all agency personnel who provided information.

NOMENCLATURE AND TAXONOMY

Desmodium humifusum (Muhl. ex Bigelow) L.C. Beck

Published in: *Botany of the northern and middle states* 86. 1933

Common names: Trailing tick-trefoil, Eastern trailing tick-trefoil, Ground-spreading tick-trefoil

Synonym: *Meiboma humifusa* (Muhl. Ex Bigelow) Kuntze

Recent molecular evidence supports that this taxon is a hybrid (W-2). Based on allozyme evidence, Raveill (2002) argues *D. humifusum* is a hybrid between *Desmodium*

paniculatum and *D. rotundifolium*. *D. humifusum* is sympatric in distribution with the purported parental species. The parents are usually found in different habitats, with *D. paniculatum* preferring sunnier sites, including woodland openings and edges and *D. rotundifolium* more likely to be found in interiors of woods. Raveill (2002) notes the species are most often seen together when natural or man-made disturbance opens the woodland canopy. He notes the parental species do co-occur in the same sites in Michigan but no individuals of *D. humifusum* have ever been seen in the state. Genetic data support local hybridization as the origin of disjunct populations, not long distance dispersal. The taxon was found to consist of both F₁ interspecific hybrids and later-generation hybrids (Raveill 2002). Introgression with the parental species was not obvious.

Raveill (pers. com.) further feels the potential parents at some locations include the elements of the *D. paniculatum* complex that are hairier and have broader leaflets, namely *D. perplexum* and *D. glabellum* or as the questionable name *D. dillenii*.

Desmodium glabellum and *Meibomia glabellum* have been misapplied to this taxon (Gleason and Cronquist 1991), contributing to taxonomic confusion. Raveill (2002) notes the general difficulty of species delineation in the genus.

DESCRIPTION OF SPECIES

From Gleason and Cronquist (1991) and others:

Stems: Trailing or prostrate, to 1 m or more, pubescence sparsely long pilose, uncinately puberulent and with longer spreading hairs mixed with shorter, hooked ones;

Stipules: Ovate- to lance-acuminate, persistent, 4-8 mm;

Petioles: 2.8-4.8cm long, with densely spreading pubescence;

Leaves: Alternate, pinnately 3-foliolate;

Leaflets: Appressed-hairy on both sides and sometimes with a few hooked hairs, the terminal one ovate or rhombic, 5-7 x 3-5 cm;

Racemes: Axillary and terminal, branching;

Flowers: Purple 7-9 mm, on pedicels to 9 mm; articles 3 or 4, 6-8 x 4-5 mm, deltoid (the upper suture straight) or rhombic (both sutures angled), bracts falling early;

Fruit: A segmented loment (a legume with one-seeded joints), 3-4 segments, each 6-8 mm long, convex above, asymmetrically obtusely angled below.

Trailing tick-trefoil differs from other prostrate species in its loment segments that are asymmetrically angled beneath (Isley 1990). It can be distinguished from *D. paniculatum* and similar species based on its trailing habit and usually more conspicuous stipules. Raveill (2002) distinguished between the taxa with the following table:

Traits/Species	<i>D. paniculatum</i>	<i>D. humifusum</i>	<i>D. rotundifolium</i>
Habit	Upright	Trailing	Prostrate
Stem pubescence	Glabrous or	Sparsely long	Densely long
	sparsely	pilose and	pilose and
	strigose	unicinulate	unicinulate
Stipules	Subulate and often	Lanceolate and	Broadly ovate
	deciduous	persistent	and persistent
Leaflet shape	Lanceolate	Rhombic	Suborbicular

LIFE HISTORY

Herbaceous, vine-like perennial, spreading via trailing stems up to 2 m long (W-7).

Reproduction

Trailing tick-trefoil flowers in July and August. Seeds require no pretreatment for germination. According to the Center for Plant Conservation (W-2), The New England Wildflower Society (Framingham, MA) has collected seed and conducted germination trails. Inspection of many intermediate characters shown by the resulting seedlings, however, raises questions about the distinct identity of putative *D. humifusum* populations (W-2). This may reflect the hybrid origin of the taxon.

Ecology

Raveill (2002) found, during his genetic studies, a large clone of trailing tick-trefoil consisting of an estimated 100 stems. He notes stem counts may grossly overestimate the number of genetic individuals at a site.

Dispersal/Migration

Fruits are segmented loments with hairs and are likely dispersed on animal fur.

Obligate Associations

A member of the legume family, trailing tick-trefoil may have associations with symbiotic, nitrogen-fixing root nodule bacteria.

HABITAT

Range-wide

Desmodium humifusum is found in open, sunny woods with sandy acidic soils that formed on chert or sandstone (W-7). However, Raveill (pers. com.) questions a preference for acidic soils, having seen the plant on marble substrate, limestone-looking rock, and at three Missouri sites growing closely associated with exposed dolomite.

Raveill (2002) found populations for his genetic studies along heavily overgrown powerline cuts. Rawinski (1990) notes that in the northeast, plants are found in dry-mesic habitats that are very rich in native legumes and that these habitats are not easy to find.

National Forests

Habitat on the Hoosier National Forest in Indiana is dry forest. (Hedge et al. 2002). In Indiana, trailing tick-trefoil is found with *Desmodium rotundifolium* and *D. dillenii* (Indiana Natural Heritage Database 2002), *Quercus stellata* and *Fraxinus americana*, *Desmodium paniculatum*, *Verbesina helianthoides* and *Gillenia stipulata* (Hedge et al. 2002).

Site Specific

The single occurrence on the Hoosier National Forest (Clover Lick Barrens) is in the Shawnee Hills section of Perry County. The population occurs in dry forest habitat, on relatively sunny south-facing slopes (Larson, pers. com.).

DISTRIBUTION AND ABUNDANCE

Range-wide Distribution

Gleason and Cronquist (1991) list the plant from MA to MD and south to MO. It is known historically from central New England (CT, DE, MD, MA, NJ, NY, PA) and disjunct to the west in Indiana and Missouri (W-7).

Desmodium humifusum is an infrequently collected species (Isley 1990). Herbarium records show 35 specimens from 19 (W-2) or 22 (Rawinski 1990) sites in the northeast (W-2). No known collections were made between 1948 and 1986

(Rawinski 1990). The number of extant populations has been in decline and trailing tick-trefoil is ranked as extirpated (state historic) in DE, MD, NJ, and NY. Many historical localities have been searched, but few populations relocated (W-2). However, three new localities were rediscovered during a focused survey in New England (Rawinski 1990).

State and National Forest Distribution

Records of the Indiana Natural Heritage Database (2002) list one site on the Hoosier National Forest, in the Shawnee Hills section in Perry County (Larson pers. com.). This is the only occurrence in the Database. There is additional favorable habitat that might support additional populations (Hedge et al. 2002). Although recent surveys observed only a few plants at the site, botanists described the plants as fairly vigorous. 1-10 plants were seen in at this site in 2000 (Indiana Natural Heritage Database 2002). During a survey in August of 2004, Kirk Larson (pers. com.) observed 5-6 plants in flower and a few other non-flowering plants in scattered groups within the small barrens opening.

RANGE WIDE STATUS

Desmodium humifusum has a Global Heritage Status Rank of G1G2Q (W-7). This rank is used for plants that are at high risk of extinction due to extreme rarity, very few populations (5 or fewer for G1, 20 or fewer for G2), steep declines, or other factors. The range of two G values reflects uncertainty. The “Q” indicates questionable taxonomy, related to the species purported hybrid status. Its National Heritage Status Rank is N1N2.

It is ranked as S1 (extremely rare; typically 5 or fewer known occurrences in the state, or only a few) in CT, IN and MA. It is ranked as historic, or extirpated (SH - historically known from the state, but not verified for an extended period of time (usually more than 20 years) with the expectation that it may be rediscovered and is therefore not tracked in DE, MD, NJ and NY. In PA, it is ranked SU (unrankable). A detailed list of rank by state is in the appendix.

It is officially designated as a hybrid in MO and is not tracked. Hybrids between non-listed species cannot receive federal listing, no matter how rare they are. Many states follow the same philosophy.

It is listed as Endangered in IN, MA and NJ and NY and as Endangered-extirpated in MD.

Desmodium humifusum is a Regional Forester Sensitive Species on the Hoosier National Forest in IN.

Trailing tick-trefoil is reported to be poorly known but thought to have been widespread in the northeast at one time and to now be reduced to a few remnant populations (W-7). It has been documented historically from two locations in New Jersey. It was last documented in 1887 from Hunterdon County and in 1947 from a site in Monmouth County (Elena Williams, pers. com.).

Trailing tick-trefoil is not currently listed in Connecticut (Karen Zyko, pers. com.). It is classified as a species of Special Concern. The state's Natural Heritage Database has records for three localities, two seen in the early 1990's, one not seen since 1901. The more recent sightings had small sized populations (ca. 10 plants (Raveill 2002)), and was reported to be likely to have poor viability. Due to its purported hybrid status, the plant has not received a lot of attention (Ken Metzler, pers. com.).

In Maryland, the only good record is from Wicimico County in 1867. The other records are doubtful and may actually be *Desmodium glabellum* (Chris Frye, pers. com.). The plant is ranked as SH (historically known from MD, but not verified for an extended period of time (usually more than 20 years), with the expectation that it may be rediscovered) and listed as "x", endangered extirpated, a classification for species that were once a viable component of the flora of the state, but for which no naturally occurring populations are known to occur in the state.

Two populations are known from Massachusetts (Paul Somers, pers. com), one on a Division of Fish and Wildlife property that was purchased, in part, to protect the plant. The second is on a powerline right-of-way. An additional old locality, not thought to be extant, is on a site recently turned over to the Division of Fish and Wildlife. One site had 50-100 plants in 1990, the other 10 plants (Raveill 2002).

Desmodium humifusum is not currently tracked or listed in Pennsylvania (John Kunsman, pers. com.). It is ranked SU. The PA Natural Heritage Database lists 9 localities, 3 deemed historic (plant not seen since 1930's), 5 deemed likely extirpated, as recent surveys have not found any plants, and one considered extant, with a small "clone" covering 1m along a road side seen in 1996. The need for more data noted. One site is on Pennsylvania Game Commission land and one is on land owned by the Bureau of Forestry (considered historical), Pennsylvania Department of Conservation and Natural Resources (extant in 1996).

New York has no current verified occurrences for trailing tick-trefoil and two historical records. It is listed as Endangered and ranked SH. The plant is also ranked SH in Delaware.

The plant is listed as Endangered in Indiana, however, the state is considering dropping this species from listing based on hybrid status (Homoya, pers. com.). Indiana Natural Heritage Database records have one occurrence in the state. Mike Homoya (pers. com.) reports he also collected the plant in Clark County in 1995. Steve Olson, former Botanist on the Hoosier National Forest, feels if this species does turn out to be a hybrid, it is very

distinctive and the Forest should continue to monitor the population and habitat (Olson, pers. com.).

POPULATION BIOLOGY AND VIABILITY

Small population size is a characteristic of this taxon and small size puts populations at risk for extirpation from genetic and stochastic events. Procumbent stems form loose mats that make population size difficult to estimate (Rawinski 1990).

Additionally, genetic analysis by Raveill (2002) “found only 8 genetic individuals, rather than the 100 or so genets previously estimated” at one site, so the plant is very clonal. The number of genetically different individuals at a site is likely to be much lower than the census count of stems.

The hybrid origin of this taxon limits its occurrence to sites that support both parental species. Although notes on co-occurring species in Heritage Databases are often missing or incomplete, both parents are found at most site for *D. humifusum* in Massachusetts (Paul Somers, pers. com.) and at the historical locality in Maryland (Chris Frye, pers. com.).

POTENTIAL THREATS

Present or Threatened Risks to Habitat

Plants may benefit from prescribed burning (Rawinski 1990). The only site on the Hoosier National Forest is threatened by understory shading due to no prescribed burning and seriously threatened by *Coronilla varia*, Crown vetch (Olson, pers. com.). Prescribed burning is planned for the Clover Lick Barrens area in 2005 (Larson, pers. com.).

Over utilization

N/A.

Disease or Predation

No information found.

Inadequacy of Existing Regulatory Mechanisms

No information found

Other Natural or Human Factors

Reasons for decline of populations in the northeast are not known, but habitat conversion for home building, is a likely cause (W-2), along with destruction by habitat by off-road vehicles. Trailing tick-trefoil can grow along powerline rights-of-way and is apparently fairly resistant to herbicide (W-7).

SUMMARY OF LAND OWNERSHIP & EXISTING HABITAT PROTECTION

The following information was gleaned from state Heritage Databases and correspondence with agency personnel:

CT: The Connecticut Natural Heritage Database (2004) has records for five localities, two seen in the early 1990's, three not seen since 1948. One of the recently seen sites is on a National Park.

IN: Indiana Natural Heritage Database (2002) records list the single occurrence in the state as on the Hoosier National Forest. The plant site on the Hoosier is within a designated special area (Clover Lick Barrens) which is being managed for its unusual vegetative communities, including several rare plants (Steve Olson, pers. com.).

MA: Two populations are known from Massachusetts (Paul Somers, pers. com), one on a Division of Fish and Wildlife property that was purchased, in part, to protect the plant. The second is on a powerline right-of-way. An additional old locality, not thought to be extant, is on a site recently turned over to the Division of Fish and Wildlife.

PA: The PA Natural Heritage Database (2004) lists 9 localities, 3 deemed historic (plant not seen since 1930's), 5 deemed likely extirpated, as recent surveys have not found any plants, and one considered extant. Ownership was not recorded in the Element Occurrence records.

SUMMARY OF EXISTING MANAGEMENT ACTIVITIES

No information found.

PAST AND CURRENT CONSERVATION ACTIVITIES

Prescribed burning is planned for the Clover Lick Barrens area on the Hoosier National Forest in 2005 (Larson, pers. com.). The trailing tick-trefoil population will be revisited after completion of the planned burn to monitor the effects of the burning on the plants, their habitat, and the crown vetch infestation in the area.

RESEARCH AND MONITORING

Existing Surveys, Monitoring, and Research

No formal monitoring programs were identified.

Survey Protocol

N/A

Research Priorities

The Center for Plant Conservation (W-2) calls for more information to determine the status of the plant as a distinct species or as a hybrid (Raveill (2002) likely has accomplished this), analysis of its distribution with respect to environmental variables, identification of co-occurring species, characterization of animal and bacterial symbionts, and precise counts of plants in each population and measurements of reproductive output.

Rawinski (1990) notes that many legumes benefit from fire. He located a population of trailing tick-trefoil in a frequently burned oak woodland in MA. The role of fire in the life history of the plant might be worth investigating.

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APPENDIX

State Heritage Status ranks (from W-7).

Connecticut	S1	Missouri	HYB
Delaware	SH	New Jersey	SH
Indiana	S1	New York	SH
Maryland	SH	Pennsylvania	SU
Massachusetts	S1		

S1: Extremely rare; typically 5 or fewer known occurrences in the state, or only a few remaining individuals may be especially vulnerable to extirpation.

S2: Very rare; typically between 6 and 20 known occurrences; may be susceptible to becoming extirpated.

S3: Rare to uncommon; typically 21 to 50 known occurrences; S3 ranked species are not yet susceptible to becoming extirpated in the state but may be if additional populations are destroyed.

S4: Common; apparently secure under present conditions; typically 51 or more known occurrences, but may be fewer with many large populations; usually not susceptible to immediate threats.

S5: Very common; demonstrably secure under present conditions.

SX: Species has been determined or presumed to be extirpated. All historical occurrences have been searched, or all known sites have been destroyed and a thorough search of potential habitat has been completed.

SR: Reported from the state, but without persuasive documentation that would provide a basis for either accepting or rejecting the species.

S?: Not enough information available to assess at this time, more field studies and/or specimen identification is needed.

SH: Possibly extirpated (historical); occurred historically and there is some expectation that it may be rediscovered. Its presence may not have been verified in the past 20 years.

SU: Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

HYB: Unranked because it represents an interspecific hybrid, not a species.

LIST OF CONTACTS

Information Requests

- CT: Karen Zyko, Environmental Analyst, Connecticut Natural Diversity Database.
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- Ken Metzler, Botanist, Connecticut Natural Heritage Program.
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