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A Vascular Flora Of The Swaledale Railroad Prairie
In North Central Iowa

THOMAS L. EDDY

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"Railroad prairies" are remnant native grasslands that grow along railroad right-of-ways. The Swaledale railroad prairie, which is in north central Iowa, occurs along the Chicago and Northwestern Railroad Company right-of-way in Cerro Gordo County.

The railroad right-of-way and an abandoned sand pit, which lies adjacent to the railroad embankment, harbor a collection of tallgrass prairie remnants. The sand pit supplied earthen fill which was used to elevate the original railroad embankment, circa 1887. It is noteworthy that the method of excavation for fill material helped to preserve earthen knolls that are covered with original tallgrass prairie.

Plant collections were acquired from the Swaledale railroad prairie from 1976 to 1986. A total of 247 vascular plants, mainly prairie species, were identified from 64 families. Voucher specimens are housed at the University of Wisconsin-Oshkosh Herbarium (OSH).

Some duplicate vouchers were donated to the University of Northern Iowa Herbarium (ISTC).

In North Central Iowa, prairie remnants occupies the right-of-way ditches north of Swaledale. The prairie flora inhabiting the ditches along a railroad right-of-way through various times of the growing season. Many plants were photographed with 35mm color slide film to further document their presence on the railroad prairie.

Two plants reportedly observed on the Swaledale railroad prairie between 1972 and 1974 are the white lady slipper, Cypripedium candidum Nutt. and hepatica, Hepatica americana Nutt. These records are not listed in the catalog of species for lack of vouchers.

Collection sites were made at numerous points in the ditches of the right-of-way through various times of the growing season. Many plants were photographed with 35mm color slide film to further document their presence on the railroad prairie.

Voucher specimens are housed in the University of Wisconsin-Oshkosh Herbarium (OSH). Duplicate vouchers for some species were donated to the University of Northern Iowa (ISTC) through the courtesy of Neil Harriman, curator of OSH.

Nomenclature for scientific binomials follows Gleason and Cronquist (1963) except where names do not conform to the International Code of Botanical Nomenclature or new evidence presents a convincing argument that different names are appropriate. The Cyperaceae, Gramineae and Juncaceae follow Voss (1972); Equisetum follows Mickel (1979) and Salix follows Argus (1964).

The catalog of species is organized into the Periophytes, Gymnosperms, Monocotyledons and Dicotyledons. Plant families within these groups are alphabetized, as are the genera and species within a family. Each species is recorded with its scientific name and authority.

Roosa and Eilers (1978) were consulted to ascertain which species are part of Iowa's threatened and endangered flora.

A second objective of this report is to discuss the changes in vegetation since presettlement times for the area surrounding the railroad prairie. "Presettlement" in this context is circa 1850, when the original land surveys were conducted for the area that includes the study site. Transcript copies of the original land surveys were obtained from the State Archives of Iowa, Iowa State Historical Department, Des Moines, Iowa.

Library references, old newspaper articles and personal interviews with local residents, in addition to the survey records, were used to trace a history of the vegetation for the Swaledale railroad prairie from presettlement times to the present.
LOCATION, GEOLOGY, WATER RESOURCES AND SOILS

The Swaledale railroad prairie is located in the southwestern quarter of Cerro Gordo County in Pleasant Valley and Mt. Vernon townships. The site, which extends north and south, is approximately 16 kilometers south of Mason City and lies parallel to the Chicago and Northwestern Railroad tracks between section 3, T94N, R21W of the 5th Prime Meridian and section 34, T95N, R21W. The railroad prairie can be entered from the north off a county gravel road in section 34 or from section 3 off County Trunk B-60 where the road and tracks intersect at the small city of Swaledale.

The study site is approximately 2.4 kilometers long and 20 meters wide, or roughly 4.8 hectares. In addition to the railroad right-of-way, an abandoned sand pit was included as part of the study area. The sand pit, which is approximately four hectares, is adjacent to the right-of-way, occupying the middle of section 34.

The Swaledale railroad prairie is located on the northeastern fringe of the Des Moines Lobe. This landform region corresponds to the extension of Late Wisconsinan ice into central and north central Iowa (Prior, 1976). The underlying glacial till and alluvium that mantles the Upper Devonian bedrock were deposited since the Woodfordian glacial period, 12,500 to 14,000 years before the present.

The northern boundary of the Swaledale railroad prairie is on an alluvial bench, while the southern boundary marks an upland outwash plain. In between is floodplain that is part of an ancient drainageway, characterized by prairie swales and marshy surfaces.

Typical features of the local topography are the generally flat horizon, low relief and a gently undulating surface formed by long slopes, rounded ridges and a complex drainage pattern. An unnamed intermittent stream that drains surface runoff enters the sand pit in the northwest corner. At the southwest corner the drainage of the northern one-quarter of section 3. Gradient changes in habitat and uplands interconnect.

The soils of the Saude-Marshall-Lawler association in section 34 were formed on loamy and sandy alluvium (Soil Survey, 1981). The abandoned sand pit is on the edge of an alluvial bench in the southeastern one-quarter of section 34. Before the railroad began operation in 1887, most of the fill material, Flagler sandy loam, was used to form the original railroad embankment.

An intermittent stream that drains surface runoff enters the sand pit in the northwest corner. At the southwest corner the drainage of the sand pit connects with a wet swale that is underlain by Talcott clay. Dry-mesic prairie growing on the stream bench abruptly intergrades with wetland vegetation in this soil association.

The Clarion-Webster-Nicollet soil association in section 3 includes soils that were formed in glacial till and local alluvium derived from glacial till. A small wet, calcareous swale in the middle of section 3, underlain by Webster silty clay loam, harbors an association of wet-mesic and wet prairie flora that is adapted to the alkaline macronvironment.

The surrounding uplands are part of an outwash plain which is mantled with various loams of different water-holding capacities. Most of the land surrounding the railroad prairie is under cultivation.

ORIGINAL LAND SURVEY RECORDS

The original survey of town lines for the Swaledale area was completed in 1849. Section lines were platted in 1853 for the present-day civil townships of Pleasant Valley and Mt. Vernon (Land Survey, 1849 & 1853). Among the various kinds of information contained in the original fieldnotes of the surveyors are descriptions of the vegetation along survey lines. Specific plant names were not mentioned in the fieldnotes for the Swaledale area, but entire communities were recognized.

Numerous references to "prairie" and "marsh" were entered in the fieldnotes by the deputy surveyors to describe the Swaledale area in 1853. According to the survey records "prairie" was present at the quarter and corner posts for sections 3 and 10 in Pleasant Valley township. At the south corner posts between sections 3 and 4 the fieldnotes reveal: "Land gently Rolling Soil first Rate, Prairie".

The land between sections 2 and 3 in Pleasant Valley township is described in the fieldnotes as "...low level and wet soil 3d rate Prairie". "3d rate Prairie" suggests the presence of lowland prairies that interconnected with other wetlands along meandering creeks, sloughs and in grassy depressions called swales. "Prairie" was also noted at the quarter and corner posts for section 34 in Mt. Vernon township.

No reference in the fieldnotes to trees being present provides further evidence of a prairie-dominated landscape. Where trees were absent along survey lines a mound of earth was dug to indicate a boundary: "Set quarter section corner on mound of earth and sod..."

Marsh was reported to occupy the area between sections 33 and 34 of Mt. Vernon township: "Enter marsh bears SE Over same bears S.E unfit for cult. [cultivation] Enter another marsh bears SE and connects with others".

The fieldnotes report "willow brush" growing on the fringes of some marshes. The phrase "willow brush" refers to a shrub-carr community dominated by various willows, notably Salix discolor, and red-stemmed dogwood, Cornus anemonum. These shrubs are part of the present-day flora. Based on the survey records, water and wetlands were abundant resources in pre-settlement times.

Deputy surveyors were instructed to write a summary that characterized a township's natural resources, and thus its settlement potential. The following township summary is for that area of present-day Mt. Vernon:

This township is all prairie with the exception of a little scattering timber on the West side Not enough however to be of any utility to settlers It contains numerous small marshes and some of considerable extent, most of them are unfit for cultivation with but a resort to artificial means, but a small proportion of the marshes in the Township is exhibited on the plat they generally have no particular connection with each other some are very small The creek [Beaver Dam Creek] is very sluggish crooked and muddy generally has a margin of willow brush it is fit habitation for beaver and other animals The creek has its source in the large marsh [Zirbel's Slough] in the North West part of this township and the North East part of Township 95 Range 22.

The area of present-day Pleasant Valley township was summarized in this manner:

This Township has a gently Rolling surface soil is of good quality, there are portions that are covered with water and unfit for cultivation. There is one stream [Beaver Dam Creek] running through the south part of sufficient size for power for machinery with a very small portion of timber in places along its Banks. There is also a creek running through this Township that Heads in the N.W. corner and Leaves the Township in Section 13 which is deep and sluggish mud bottom and is about 20 links wide.

With the exception of a few wooded stream banks and widely scattered oak groves, the original vegetation cover for the Swaledale area prior to settlement was tallgrass prairie. Potholes, kettleholes and extinct glacial drainageways interrupt the upland plain. These lowlands were occupied by a wetlands complex comprised of low prairie, marsh, shrub-carr and sedge meadow. Most of these wetlands have been drained and converted to cropland.

EARLY SETTLEMENT TO MODERN TIMES

The presence of a rich prairie flora along certain portions of the Swaledale railroad right-of-way is evidence that these areas were not cultivated or altered significantly by agricultural practices or railroad activity before or after the railroad became established. Those areas
which contain a greater floristic diversity and that appear least disturbed correspond mainly to lowland prairie and sedge meadow habitats. Because these areas were too wet to be utilized as cropland or suitable pasture they were inadvertently preserved.

On October 18, 1887 a deed was obtained by the Mason City and Fort Dodge Railroad Company to establish a 66 foot right-of-way for rail traffic. In addition to the right-of-way, 3.7 acres of adjacent property was acquired. This acreage, located on a sandy alluvial bench, served as a sand pit that supplied earthen fill to elevate the original railroad embankment in lowland areas. The railroad was completed by 1887 (Wheeler, 1910).

In 1897 the railroad company acquired an additional 6.18 acres of land that enlarged the sand pit. Because of the method of excavation by wheel or skid scrapers, two earthen knolls, covered with mesic to dry-mesic prairie, were preserved at the southwest corner of the sand pit.

The knolls were formed as the surrounding bench was excavated. Later, draft animals, pulling a scraper filled with soil, were driven across a wooden platform that connected the knolls. Midway across the platform the scraper was tripped and the dirt was deposited through a hole in the platform to a waiting wagon below.

The narrow lane separating the two knolls is not very apparent because of some filling in from past erosion and an overgrown vegetation cover, noticeably Populus tremuloides. Tallgrass prairie occupies the top of the knolls because here the original vegetation cover was not scraped away.

Smaller knobs that occur further northeast in the sand pit are vegetated with Agropyron repens and Bromus inermis. The presence of these weedy grasses indicates that these lesser mounds are "spoil piles" composed of unused fill material.

Seasonal ponding occurs on the eastern side of the sand pit where the fill removal has created a shallow seepage. Portions on the west side of the sand pit also become seasonably ponded, although here the soils contain a greater amount of organic muck. Unlike the seasonal pools on the east side of the pit which formed as a result of being excavated, most of the low area on the west side appears to be part of the original landscape surface.

Periodic grass fires along the railroad right-of-way were common in the days of the steam locomotive, especially in the spring. Between 1915 and 1950 two freight and two passenger trains stopped in Swaledale every day. By destroying shrubs and trees the fires may have reduced competition with prairie species. In many instances it was a deliberate practice for the railroad company to begin fires in the ditches of the right-of-way to reduce the amount of woody growth.

The lands surrounding the railroad right-of-way eventually were placed under cultivation or pastured. Cereal crops that were grown then would have included corn, oats, rye and wheat, while flax and hemp were also planted at different times.

An 1894 newspaper article published in the *Mason City Daily Times-Herald* summarizes the state of agricultural affairs near the turn of the century:

> It was only a little over twenty years ago that they commenced to farm it [Pleasant Valley]. Ten years ago it was practically a prairie. Now nearly every acre of it is fenced and under cultivation. Loaded with big crops this year — oats from 30 to 90 bushels and corn from 20 to 40 bushels — it is indeed a pleasant sight to look upon. Its farmers are making money, fast improving their condition, buying improved stock of livestock and learning improved methods of farming. The next few years will see even greater changes. It is good to be a Pleasant Valley farmer.

The same news article continues with "Land selling for from $30 to $40 an acre in these times means that it is valuable."

Even at the turn of the century there was evidence of enough prairie acres to support a prairie chicken population along the right-of-way. Between 1910 and 1915 local Swaledale residents Alfred Christiansen, Bill Kruggel and Carl "Buck" Leinhaas bagged prairie chickens along the Swaledale railroad prairie.

In 1935 or 1936 my father, Leo Eddy, observed prairie chickens while hunting pheasants along the railroad embankment. Virgil Rice explained that when his family moved to the Swaledale area in 1936, he too observed prairie chickens on the 70 to 75 acres of lowland prairie that lay parallel to the railroad tracks. Today only a few acres of this prairie remain.

In more recent times the Swaledale railroad prairie has supplied some local residents with plants for decorative and medicinal uses. It is with some irony that the railroad, which divided the unbroken expanses of tallgrass prairie and helped to facilitate early settlement of the land, led to the preservation of the small but significant prairie relics north of Swaledale today.

**RESULTS AND DISCUSSIONS**

Of the total number of plants that were collected along the Swaledale railroad prairie from 1976 to 1986, 247 species were identified from 64 families. Of these there are four pteridophytes, all of which belong to the genus *Equisetum*: *E. gymnospermum, J. virginiana*; 62 monocotyledons and 180 dicotyledons.

The monocots are largely represented by 27 grasses or about 11.0% of the total railroad prairie flora, and 21 Cyperaceae, or 8.5%. The largest dicot family is the Compositae with 45 species, or 18.2% of the total prairie flora. The second largest dicot family is represented by *Lugaminosae*, or 5.7% of the total flora.

Two state threatened and one endangered species grow on the Swaledale railroad prairie. All three are wetland plants. The two threatened species are water horsetail, *Equisetum fluviatile and valerian, Valerianna dulcis*. Bog willow, *Salix parkellii* is a state endangered species.

It is possible that a relict population of the state endangered white lady slipper, *Cypripedium candidum*, could be present on the Swaledale railroad prairie since associated species grow there and two reliable sightings were made between 1972 and 1974.

The Swaledale railroad prairie is comprised of an assortment of discontinuous remnants because the original vegetation cover has been disturbed at various points along the right-of-way. Although the prairie habitats have varying soils and moisture-holding capacities, five basic prairie types are represented along the railroad right-of-way. In the order from driest to wettest they are: dry, dry-mesic, mesic, wet-mesic and wet.


Some of the grasses growing on the dryer sites are *Andropogon gerardii* and *A. scoparius*, Panicum angustifolium, *P. oligoantha*, *P. leersii*, Sorghastrum nutans and *Stipa spartea*.

Rare plants that were found growing on dry to dry-mesic prairie remnants included *Achillea viridiflora, Lechea stricta* and *Prorapollis argophylla*.

In contrast to a dry prairie flora, species that inhabit the mesic remnants include *Hypoxis biflora, Allium canadense, Tradescantia ohiensis*, *Aster ericoides, A. mueez-angulare*, A. simplex, *Cirsium dioius, Echinacea pallida*, Helianthus grosseserratus, *Heliopsis helianthoides, Liatris pycno­taea, Ranaea spicata*, *Sedum riostratum*, *Silphium laciniatum*, S. turgidum, *Solidago graminifolia, Veronica fasciculata, Monarda fistulosa, Pycnanthemum flexuosum, Dasymatrum canadense, Peta­loumum candidum,*
Phlox pilosa, Dodecatheon meadia, Lysimachia quadriflora, Anemone canadensis and Zizia aptera.

Some of the mesic to wet-mesic rarities that were found include Lilium philadelphicum, Cacalia tuberosa, Prenanthes racemosa, Canaduth americana and Eryngium yuccifolium.

The flora of the lowland prairies and related wetlands, which are elements of the Swaledale railroad prairie, includes Azelgias incana, Bidens coronis, Gentiana andrewsii, Stachys palustris, Lythrum alatum, Fraxinus pennsylvanica, Aquilegia canadensis, Morus, Lilium, and Juniperus virginiana. Sambucus canadensis, Morus, Urtica, and many other species that appears to be spreading eastward in the sand pit. The plants which must have become established after the woods came into existence on the pond beds when the waters dry up. A remnant population of Amyris viridis, Glawima hederacea, Lomarius cardacca, Abutilon theophrasti, Mirabilis nyctagnum, Plantago major, Patrinca sativa and Urnica dioica.

In the ditches along certain stretches of the right-of-way excessive mound building by pocket gophers coincides with a weedy infestation of the ubiquitous Canada thistle, Cirsium arvense. Periodically controlled burns in thistle-infested areas could help alleviate the spread of this noxious weed.

CATALOG OF SPECIES

The terms frequent, infrequent and rare are used qualitatively to describe how often a plant occurs on the Swaledale railroad prairie.

PTERIDOPHYTES

EQUIETACEAE (Horsetail Family)

Sphagnum, Phryma leptophylla, Aquilegia canadensis and Zizia aptera.

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GRAMINEAE (Grass Family)


IRIDACEAE (Iris Family)

JUNCACEAE (Rush Family)

LINGILAEAE (Lily Family)

Lilium philadelphicum L. Wood lily. Edge of damp woods and wet ditch; observed at two sites. Rare. WITT - June 30, 1968. Zygadenus elegans Pursh White camas. A small population found at one site; calcareous lowland prairie. Rare.

TYPHACEAE (Cattail Family)
Typha angustifolia L. Cattail. A small population observed in wet seepage of sand pit. Rare.

DICOTYLEDONS
ACERACEAE (Maple Family)
 Acer negundo L. Box elder. Scattered throughout sand pit and occasionally along fencerows. Frequent. A. saccharinum L. Silver maple. Low places in sand pit, especially along the south bank. Rare.

AMARANTHACEAE (Amaranth Family)
Amaranthus albus L. Pigweed. A native weed; railroad right-of-way gravel and other disturbed ground. Frequent. ANACARDIACEAE (Cashew Family)
Anacardium occidentale L. Smooth sumac. Forming thickets on northeast perimeter of sand pit. Frequent.

APOCYNACEAE (Dogbane Family)
Apocynum androsaemifolium L. Dogbane. Ditches and wooded openings in sand pit. Frequent.

ASCLEPIADACEAE (Milkweed Family)

BALSAMINACEAE (Touch-Me-Not Family)

BORAGINACEAE (Borage Family)
Cynoglossum officinale L. Hound's tongue. A weed of dry, wooded openings. Rare.

Lithospermum canescens (Michx.) Lehm. Hoary pussytoon. Dry to dry-mesic prairie habitats. Frequent.

CAPRIFOLIACEAE (Elderberry Family)
Lonicera tatarica L. Honey suckle. Escape from cultivation; throughout the sand pit. Frequent. Sambucus canadensis L. Elderberry. Moist ditches, fencerows and eastern perimeter of sand pit. Rare.

CAROPHYLLACEAE (Pink Family)

CHENOPODIACEAE (Goosefoot Family)
Chenopodium album L. Lamb's quarters. Frequent weed.

CISTACEAE (Rockrose Family)
Lathyrus sativus L. Broad bean. A weed. Rare.

COMPOSITAE (Composite Family)


BALSAMITACEAE (Balsam Poplar Family)

CISTACEAE (Rockrose Family)
Cistus salviaefolius L. Cistus. Infrequent.

COMPOSITAE (Composite Family)


BALSAMITACEAE (Balsam Poplar Family)

CISTACEAE (Rockrose Family)
Cistus salviaefolius L. Cistus. Infrequent.
Bidentis cernua L. Sticktight. Wet ditches. Frequent.

Convolvulus arvensis L. Field bindweed. Frequent weed in ditches. C. sepium L. Hedge bindweed. Frequent weed in ditches.

Cucurbitaceae (Gourd Family)


EUPHORBIACEAE (Spurge Family)


GENTIANACEAE (Gentian Family)


LABIATE (Mint Family)

Glochidion balsacrum L. Ground ivy. Frequent weed in sand pit.

LEUCOCHLOORACEAE (Dogwood Family)

Ligustrum vulgare L. Motherwort. Frequent weed.

LYTHRACEAE (Loosestrife Family)


LEGUMINOSAE (Legume Family)


LOBELIACEAE (Lobelia Family)

Lobelia spicata Lam. Pale-spiked lobelia. Dry-mesic to mesic prairies. Frequent. L. thyrsiflora L. Indian plantain. Lowland prairie; observed at one location. Rare.

MORACEAE (Mulberry Family)

Morus alba L. Mulberry. Escape from cultivation; fencerows and along a shaded bank in sand pit. Rare.

NYCTAGINACEAE (Four O’clock Family)

Mirabilis nyctaginoides (Michx.) MacM. Four o’clock. Railroad right-of-way gravel. Frequent.

OLEACEAE (Olive Family)


ONAGRAEAE (Evening Primrose Family)


Sanguinaria canadensis L. Bloodroot. One clump of seven plants observed along a shaded bank in sand pit. Rare.
ACKNOWLEDGEMENTS AND DEDICATION

I am grateful to all the people who have assisted me in one way or another during the course of this study. A special thanks is extended to Carol Ames Witt for permitting me to examine specimens from her personal plant collection; and thanks to Melicent Ames, Bethel Enabnit and Virginia Schmitz for sharing

Thanks is also extended to Dave and Carolyn Just for permitting

REFERENCES


SAVIFRAGACEAE (Gooseberry Family)


SCRUPOULARIACEAE (Snapdragon Family)


SOLANACEAE (Nightshade Family)


ULMACEAE (Elm Family)

Ulmus pumila L. Siberian elm. Escape from cultivation; invading railroad right-of-way ditches and well established. Frequent.

UMBELLIFERAEE (Parsley Family)


URTICACEAE (Nettle Family)

Urtica dioica L. Stinging nettle. Frequent weed.

VALERIANACEAE (Valerian Family)

Valeriana edulis Nutt. ex T. & G. (= V. ciliata T. & G.) Valerian. Two clumps of plants observed at one location; calcareous swale. Rare. IOWA THREATENED SPECIES.

VERBENACEAE (Vervain Family)


VIOLACEAE (Viol Family)


VITACEAE (Grape Family)


RUBIACEAE (Madder Family)


RUBIACEAE (Madder Family)


S. pedicellata Pursh Bog willow. Wet-mesic prairie; observed at one location.
me to use their field lanes for access to the railroad prairie.

I also wish to thank Dr. Neil A. Harriman, University of Wisconsin-Oshkosh, for volunteering his curatorial assistance and for proof-reading this manuscript. I also gratefully acknowledge the thoughtful suggestions offered by Dr. Larry J. Eilers, University of Northern Iowa.

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An especially sincere thank you goes to Barbara Schlorholtz Eddy for her encouragement, suggestions and companionship throughout this project.

The year 1987 marks the centennial birthday of my hometown, Swaledale, Iowa. As a token of my affections for a little town where I learned about my prairie heritage, this paper is dedicated to Swaledale.

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