

# A HILLSIDE MARSH IN EAST-CENTRAL ILLINOIS

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## GENERAL DESCRIPTION OF AREA

The marsh is located 0.6 mile east and 0.3 mile south of the Route 16 bridge that crosses the Embarrass River east of Charleston, Coles County, Illinois. It consists of approximately one-half an acre situated at the base and lower slope of a hill in a small valley of an intermittent stream flowing directly into the Embarrass River. The marsh is "L" shaped, with one arm at the base of a west-facing slope and the other arm at the base of a north-west-facing slope (Fig. 1). The largest portion of the west marsh area (*i.e.*, adjacent to the west slope) is a flat lowland of standing water in an abandoned stream channel. It affords little drainage and includes a marshy area of seepage on the base of the slope. All of the west marsh area is subject to slight grazing. The north marsh area (*i.e.*, adjacent to the north slope) is somewhat higher on a five to ten percent slope. Although this area is better drained, the soils were saturated and contained some standing water in small depressions throughout 1957. The north marsh area may be divided into three parts according to grazing intensity: heavily grazed, lightly grazed, and ungrazed.

The marsh is fed by cool alkaline seepage water from gravelly deposits in the hill which appear to be parts of an esker on the Shelbyville moraine (Fig. 1). During the winter of 1957-58, water seeping from the hillside formed a four-

eight-inch ice sheet over both areas.

The soil is slightly alkaline and high in organic matter to a depth greater than six feet in the center of the marsh, becoming rather shallow and mixed with alluvial material near the steeper slope. Crust-like cementations of lime and iron up to six inches in thickness are common at the soil surface of most of the north marsh area. These are formed as minerals are precipitated out of the seepage water. The soil near the stream is light sandy alluvium. In late June, 1957, a seven and one-half inch rainfall caused the stream to flood the west marsh area leaving a four- to eight-inch layer of sand on the southern end. This changed the drainage of the area so that this end of the west marsh area contained less standing water than previously.

## LIST OF THE VASCULAR PLANTS

The collection area extended to the limits of the creek on the west, to the border of the marsh on the north, and up to the dryer hillside on the east (Fig. 1). Several marginal herbs were collected, but no attempt was made to include trees of the adjacent forest. The areas were observed every week beginning in March, 1957, and ending in October of the same year. All specimens were placed in the herbarium at Eastern Illinois University. The system of classification was that of Jones (1950). The vascular plants marked with an asterisk have not

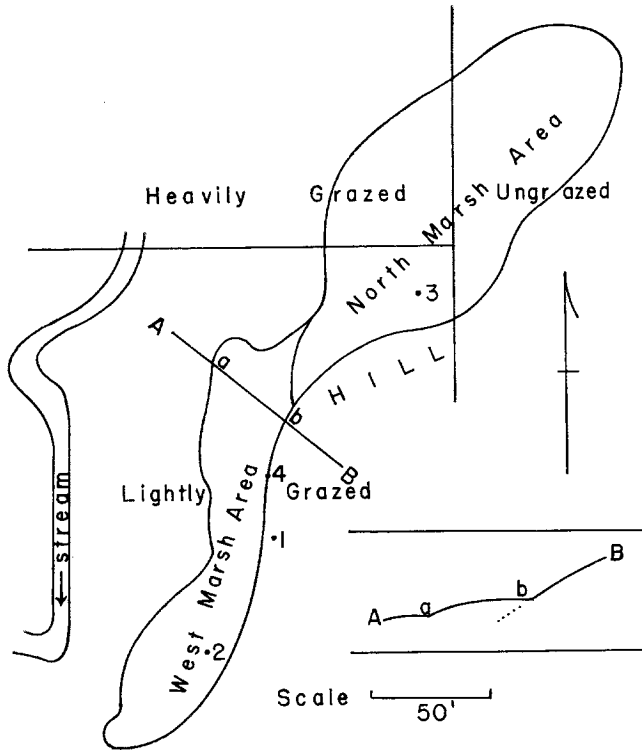


FIG. 1.—Map of marsh showing grazing intensities. Numbered points represent temperature stations. Insert shows approximate profile of line AB on map.

previously been reported for Coles County:

Equisetaceae

- Equisetum arvense* L.
- E. hyemale* L.\*
- Seiaginella* sp.

Typhaceae

- Typha latifolia* L.

Alismataceae

- Alisma subcordatum* Raf.
- Sagittaria latifolia* Willd.\*

Gramineae

- Bromus racemosus* L.\*
- Glyceria striata* (Lam.) Hitchc.
- Sphenopholis obtusata* (Michx.) Scribn.\*

Cyperaceae

- Carex blanda* Dewey
- C. hystericina* Muhl.\*
- C. lacustris* Willd.\*
- C. lurida* Wahl.
- C. muhlenbergii* Schk.\*

- C. shortiana* Dewey\*
- C. scoparia* Schk.\*
- C. vulpinoidea* Michx.
- Cyperus diandrus* Torr.\*
- C. flavescens* L.
- C. strigosus* L.
- Eleocharis calva* Torr.\*
- Scirpus atrovirens* Willd.
- S. validus* Vahl\*

Commelinaceae

- Tradescantia virginiana* L.

Juncaceae

- Juncus interior* Wieg.\*
- J. tenuis* Willd.
- J. torreyi* Coville

Liliaceae

- Trillium recurvatum* Beck
- Uvularia grandiflora* Sm.

Iridaceae

- Iris shrevei* Small\*
- Sisyrinchium angustifolium* Mill.

Salicaceae

- Salix discolor* Muhl.
- S. nigra* Marsh.

- Urticaceae  
*Boehmeria cylindrica* (L.) Sw.
- Polygonaceae  
*Polygonum virginianum* L.
- Nyctaginaceae  
*Mirabilis nyctaginea* (Michx.) MacM.
- Portulacaceae  
*Claytonia virginica* L.
- Caryophyllaceae  
*Saponaria officinalis* L.  
*Silene stellata* (L.) Ait. f.
- Ranunculaceae  
*Anemone virginiana* L.  
*Caltha palustris* L.  
*Isoopyrum biternatum* (Raf.) Torr. & Gray  
*Ranunculus septentrionalis* Poir.  
*Thalictrum dioicum* L.  
*T. revolutum* DC.
- Berberidaceae  
*Podophyllum peltatum* L.
- Cruciferae  
*Cardamine bulbosa* (Schreb.) BSP.
- Grossulariaceae  
*Ribes americanum* Mill.
- Rosaceae  
*Agrimonia Pubescens* Wallr  
*Gillenia stipulata* (Muhl.) Trel.  
*Geum canadense* Jacq.
- Leguminosae  
*Amphicarpa bracteata* (L.) Fern.  
*A. comosa* (L.) G. Don.\*  
*Apios americana* Medic.\*  
*Cassia fasciculata* Michx.\*  
*Desmodium cuspidatum* (Muhl.) Loud.  
*D. glutinosum* (Muhl.) Wood
- Geraniaceae  
*Geranium maculatum* L.
- Balsaminaceae  
*Impatiens biflora* Walt.
- Polygalaceae  
*Polygala senega* L.
- Anacardiaceae  
*Rhus radicans* L.\*  
*R. vernix* L.
- Rhamnaceae  
*Ceanothus americanus* L.
- Violaceae  
*Viola cucullata* Ait.\*  
*V. siriata* Ait.
- Onagraceae  
*Epilobium adenocaulon* Haussk.\*  
*Oenothera biennis* L.
- Umbelliferae  
*Oxypolis rigidior* (L.) Raf.
- Primulaceae  
*Dodecatheon meadia* L.  
*Lysimachia quadriflora* Sims.
- Gentianaceae  
*Sabatia angularis* (L.) Pursh.
- Asclepiadaceae  
*Asclepius incarnata* L.
- Convolvulaceae  
*Convolvulus sepium* L.
- Polemoniaceae  
*Phlox glaberrima* L.\*  
*P. divaricata* L.  
*Polemonium reptans* L.\*
- Hydrophyllaceae  
*Hydrophyllum virginianum* L.
- Boraginaceae  
*Lithospermum canescens* (Michx.) Lehmann.
- Verbenaceae  
*Phyla lanceolata* (Michx.) Greene.  
*Verbena striata* Vent.  
*V. urticaefolia* L.
- Labiatae  
*Agastache nepetoides* (L.) Ktze.\*  
*Blephilia hirsuta* (Pursh) Torr.  
*Monarda fistulosa* L.  
*Pycnanthemum incanum* (L.) Michx.  
*P. pilosum* Nutt.
- Solanaceae  
*Physalis pumila* Nutt.
- Scrophulariaceae  
*Chelone glabra* L.\*  
*Lindernia anagallidea* (Michx.) Raf.\*  
*Gerardia tenuifolia* Vahl  
*Mimulus ringens* L.\*  
*Pedicularis lanceolata* Michx.  
*Penstemon digitalis* Nutt.  
*Scrophularia marilandica* L.  
*Veronica connata* Raf.\*
- Acanthaceae  
*Ruellia strepens* L.
- Phrymaceae  
*Phryma leptostachya* L.
- Caprifoliaceae  
*Triosteum perfoliatum* L.
- Campanulaceae  
*Campanula americana* L.
- Lobeliaceae  
*Lobelia siphilitica* L.
- Compositae  
*Achillea millefolium* L.  
*Erigeron annuus* (L.) Pers.  
*E. philadelphicus* L.  
*Eupatorium coelestinum* L.  
*E. perfoliatum* L.  
*E. purpureum* L.  
*Helenium autumnale* L.  
*Helianthus annuus* L.\*  
*Rudbeckia hirta* L.  
*Silphium perfoliatum* L.  
*Vernonia altissima* Nutt.

Summary: families -- 46; genera -- 86; species -- 111.

## ECOLOGICAL DESCRIPTION

The richness of the vegetation of the marsh varied with the amount of grazing, so that not all the associations are as they would be in their natural state. Black willow, *Salix nigra*, is dominant around the better drained portions of both marsh areas and decreases in importance toward the more poorly drained portions. The largest specimens were eight to ten feet tall and occurred adjacent to the hillside and in the ungrazed area. Pussy willow, *Salix discolor*, was an occasional associate with the larger black willows, but did not seem to be reproducing. At the extreme boundary of the west marsh area were occasional representatives of *Thalictrum revolutum*, *Triosteum perfoliatum*, *Tradescantia virginiana*, and *Equisetum hyemale*. Along the margin of the north marsh area bordering the woodland the following spring species were noted: *Thalictrum dioicum*, *Tradescantia virginiana*, *Claytonia virginica*, *Dodecatheon meadia*, and *Viola cucullata*.

Sedges were definite dominants in open areas during all but the early part of summer. In the saturated regions on the west marsh area, the early spring aspect dominant was marsh marigold, *Caltha palustris*, with *Cardamine bulbosa* as an associate. During the early part of the season *Glyceria striata* and *Sphenopholis obtusata* were abundant in the southern end of the west marsh area. *Eleocharis calva*, *Penstemon digitalis*, *Asclepias incarnata*, and *Veronica connata* were common during June and July along the western border of the west marsh area. Later in the season *Cyperus*

*strigosus* replaced *Glyceria* and *Sphenopholis*, and *Helenium autumnale* and *Rudbeckia hirta* replaced *Asclepias*.

On the lightly grazed portion of the north marsh area *Lysimachia quadriflora* was an associate with the sedges during early summer. As the season progressed *Oxypolis rigidior* and *Chelone glabra* became associates to the sedges. In the heavily grazed area of the north marsh area *Cyperus diandrus* and *C. flavescens* were almost exclusive dominants, with the exception of *Sagittaria* in the wetter areas. No species of large plants occurred in this area.

The ungrazed portion of the north marsh area was occupied by more dense vegetation than the rest of the marsh. Black willow was distributed more evenly with the larger willow trees scattered throughout. The abundance of *Apios americana* on the willow made walking about quite difficult in the area. Sedges were abundant in openings between the willow, with *Carex lacustris* being the most abundant species.

Three species not common in East Central Illinois were found in the marsh: poison sumac, *Rhus vernix*; marsh marigold, *Caltha palustris*; and fireweed, *Epilobium adenocaulon*. Only one specimen of poison sumac was living, and it occurred in the ungrazed portion of the marsh. Several dead stumps were observed, and the remaining specimen had several dead branches. Distribution of poison sumac, as reported by Jones and Fuller (1955) and Deam (1940), indicates that it occurs more frequently farther north and east in better developed marshy or boggy habitats (Waterman, 1926), but in

TABLE 1.—Soil Temperatures of the Marsh on Eight Different Days, April to August, 1957.

Station	Av. temp., F.	Temp. range
1 (dry hillside).....	69	57-89
2 (standing water)....	64	55-74
3 (willow shade).....	62	52-74
4 (point of seepage)...	59	51-65

the study area this species is evidently at the limit of its range. The sumac stumps suggest that in recent years conditions must have been less favorable for the growth of this species.

Two specimens of fireweed were found along the north-west border of the west marsh area. These were at least 100 miles south of other reported specimens, Jones and Fuller (1955) and Deam (1940). The occurrence of only two individuals suggests that fireweed may be a relic which may soon be eliminated from the area.

Marsh marigold was abundant throughout a good part of the marsh and occurred in several other cool seepage areas in the valley. The distribution of marsh marigold (Jones and Fuller, 1955; and Deam, 1940) indicates that this species is not common in east-central Illinois and approaches its southwestern limit in Coles County. In the areas of relatively high light intensities marsh marigold appeared largely restricted to standing water, but where shade was provided by willows it was most abundant in areas of little or no standing water. To determine whether soil temperature is a factor in this distribution the

the average and extreme soil temperatures were taken at a three-inch depth for eight readings at each of four stations (Fig. 1) from April through August, 1957, (Table 1). The coldest temperatures were where water seeped from the hill (station 4) while the highest temperatures occurred outside the marsh on the dry hill above the seepage (station 1). The shaded areas (station 3) appeared to be cooler than the open areas of standing water (station 2). Ten other temperature stations similar to stations 2 and 3 were observed with comparable results. Since the temperatures of the soil in standing water (station 2) appeared to be slightly higher than the temperatures in the shade (station 3), it may be suggested that the persistence of marsh marigold in the marsh is dependent upon the presence of standing water, or upon cool temperatures maintained by partial shade.

The several communities arranged according to soil drainage and amount of grazing suggest a successional pattern in which sedges were the pioneers in the seepage and the most poorly drained areas. Marsh marigold may be present in this stage as an associate, but it will not reproduce itself where drainage increases. Apparently it is most susceptible to this moisture change if it is in direct sunlight; in some shade it often persists into later stages. Black willow and, in some areas, pussy willow invaded the sedge association. Both species reached a height of eight to ten feet with pussy willow as an associate with the dominant black willow. Pussy willow was not reproducing itself on the marsh as was black willow.

The abundance of many young black willows apparently invading the open marsh, the death of poison sumac, the occurrence of only two specimens of fireweed, and the lack of reproduction of pussy willow all point to a changing environment.

Perhaps this indicates that the species here represented at the limit of their range may eventually die and be replaced by the willow. The willow may even be further replaced by some of the flood plain trees such as sycamore, elm, and box elder which occur along the stream bank. However, the deep organic soil points to the fact that the marsh has persisted for a long time, perhaps since the Pleistocene. If part of the area continues to be protected from grazing and continues to receive cool alkaline seepage, it is very possible that this unique community may be able to persist in this local micro-environment. Under these conditions poison sumac and fireweed might not persist, but marsh marigold would probably continue in the shade of the stunted willow association.

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#### SUMMARY

A unique marsh in east-central Illinois was studied in 1957 from a floristic and ecological viewpoint. Of the 111 species in 46 families collected, 29 species had not previously been reported in Coles County. The marsh contained several species at the limits of their ranges, the persistence of which is dependent upon cool alkaline seepage areas. Succession is thought to occur from an open sedge association to a willow association. Fireweed and poison sumac may disappear, but marsh marigold will probably remain in the willow association if grazing is minimized and if standing water and present temperatures persist.

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