

## BRIEF NOTE

VEGETATIONAL HISTORY OF MENTOR MARSH<sup>1</sup>NEIL P. BERNSTEIN,<sup>2</sup> Department of Biology, John Carroll University, University Heights OH 44118

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During the summer of 1976, a study of habitat selection by red-winged blackbirds (*Agelaius phoeniceus*) was conducted at Mentor Marsh in Mentor, Ohio (Bernstein and McLean 1980). This paper is a summary of the material collected from written records and personal communications concerning the vegetational history of Mentor Marsh plus my observations. A more detailed description and complete bibliography of the material presented can be found in Bernstein (1977).

## Topography and Geology

Mentor Marsh Natural History Landmark is located on the lake plains of north-central Lake County and covers an area of approximately 800 acres. It varies from 0.25 to 0.50 miles in width and is approximately 4.50 miles long. Isard (1966) states that the marsh is 600 ft above sea level and about 20 to 25 ft above Lake Erie. The angle of decline from the surrounding uplands to the marsh is usually below 20 degrees and it is most gentle on the eastern edge. With exception of two natural highlands, little change in elevation occurs within the marsh.

Three man-made structures presently traverse the marsh (fig. 1). Corduroy Road allows vehicular traffic, while the Wakerobin Trail and the sewer Pipeline between Becker Pond and the north shore of the marsh are footpaths. Roads no longer in use are also in evidence.

Black Brook is the only noticeable surface stream, and upon entering the

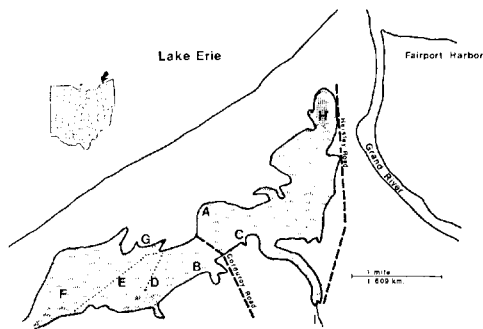


FIGURE 1. Map of Mentor Marsh. A. Study Area A, B. Study Area B, C. Study Area C, D. Wakerobin Trail, E. Becker Trail, F. Becker Pond, G. School Forest, H. Shipman Wildlife Memorial at Shipman Pond, I. Black Brook. Insert—Map of Ohio showing the approximate location of Mentor Marsh in Lake County. Stippled area—indicate open bodies of water within the marsh.

marsh in the south-east corner, the stream becomes distributary and no main channel can be discerned (see fig. 1). Becker Pond and Shipman Pond are the two largest bodies of open water, about 3 acres each, and several smaller areas of open water exist, some seasonally. The size and number of these areas of open water are dependent upon amount of rainfall in any one year. Zimmerman (1976) and Newhous (1976) point out that three areas east of Corduroy Road on the south shore were dynamited in the late 1960's in an attempt to create open water that would attract waterfowl.

Mentor Marsh is geologically unusual because, unlike northwest Ohio with its many marshes, marshes are not common in northeast Ohio. The present marsh was probably formed from a westward flowing segment of the Grand

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River when, at some unknown time, the river formed a new easterly mouth into Lake Erie and the isolated river segment, on a bedrock base surrounded by upland forests, developed into Mentor Marsh (Aronson 1974, Bernstein 1977).

#### Vegetation of Mentor Marsh

It is not certain how the marsh appeared to the first settlers, but published interviews from early settlers to the area provided clues (Gault 1957). It appears that the marsh was largely an open body of water until the early 1800's, but by 1937, a dense swamp had developed in the eastern portion. By 1951, little herbaceous vegetation was apparent and the swamp forest covered most of the area. In 1959, a die-off of the swamp forest began that was witnessed by many area residents (Zimmerman 1976) and is evidenced by aerial photographs that indicate dying trees (Bernstein 1977). It is not known why the die-off occurred, but leakage of salt into Black Brook from surrounding salt mining operations or a fluctuating water table are possible explanations.

Isard (1966) divided the vegetation into 5 communities: the cattail-nightshade (*Typha-Solanum*) community, the mixed-oak (*Quercus*) swamp forest, the maple-ash-elm (*Acer-Fraxinus-Ulmus*) swamp forest, the beech-maple (*Fagus-Acer*) forest, and the buttonbush-willow (*Cephalanthus-Salix*) community. The buttonbush-willow community at Shipman Pond is no longer present due to flooding created by a beaver (*Castor canadensis*) dam at the northeast corner of the pond. Killed were the buttonbush (*Cephalanthus occidentalis*), swamp loosestrife (*Decodon verticillatus*), and the surrounding blackwillow (*Salix nigra*) as described by Aldrich (1943). (At the time of Aldrich's study, Shipman Pond was referred to as Norton's Pond.)

The mixed-oak swamp forest, which is located on the extreme eastern edge of the marsh bordering on Heisley Road, is now largely dead trees as is the majority of the maple-elm-ash swamp forest once present on the eastern edge of the marsh and in localized areas. Beech-maple forest presently covers most of the uplands on the northern border of

the marsh in the School Forest, and the southern border is mostly mixed oaks. The remainder of the marsh, central and southeast portions, is a cattail-nightshade community. Neither the broad-leaved cattail (*Typha latifolia*) nor the narrow-leaved cattail (*T. angustifolia*) was dominant at the time of Isard's study (1966) and both were associated with bittersweet nightshade (*Solanum dulcamara*). This community still exists, but it has been almost entirely replaced by common reed (*Phragmites australis*).

#### Plant Succession and Communities

In the early 1800's, the marsh was largely an open body of water that had no substantial influx of water other than Black Brook. I assume that succession first created a marsh, followed by a swamp forest, that was replaced by the present marsh after the die-off. Aldrich (1943) described the primary successional stage from marsh to swamp forest in northeastern Ohio as the *Cephalanthus-Alnus* associates. At the time, the sere consisted of buttonbush (*Cephalanthus occidentalis*) or speckled alder (*Alnus rugosa*). In my study, *C. occidentalis* was extremely rare, but *A. rugosa* was common and it was often seen in the same habitat with common buckthorn (*Rhamnus cathartica*). Aldrich termed the climax swamp forest community the *Acer-Ulmus-Fraxinus* associates. Of the characteristic primary dominants, red maple (*Acer rubrum*), American elm (*Ulmus americana*), and white ash (*Fraxinus americana*) are currently common, but swamp white oak (*Quercus bicolor*), silver maple (*Acer saccharinum*), black ash (*Fraxinus nigra*), and pin oak (*Quercus palustris*) are less common in Mentor Marsh. This is in agreement with Isard's (1966) vegetation survey although *Q. bicolor* and *F. nigra* were then more common.

Two secondary successional communities were listed by Aldrich (1943): the *Cornus-Rosa-Spiraea* associates and the *Salix-Populus-Quercus* associates. Of the first, red-osier dogwood (*Cornus stolonifera*), swamp rose (*Rosa carolina*), and elderberry (*Sambucus canadensis*) are indicator plants that were found along

Becker Trail. Narrow-leaved meadow-sweet (*Spiraea alba*) was not observed in my study or those of Isard (1966, 1967). The *Salix-Populus-Quercus* community is characteristic of the seral stage leading to the *Quercus-Carya* forest. Of typical species in this community, cottonwood (*Populus deltoides*) was common along Becker Trail; *Q. bicolor* was not common, but it was found in small groups in the open marsh; *Q. bicolor* was common, but was found in small numbers on Wakerobin Trail and in the northeast corner of the marsh. Since these plants are typical of secondary succession, they may be an indication of a return to the swamp forest or they may be remnants that survived the die-off of the first swamp forest. Isard (1966) reported presence of poison sumac (*Rhus vernix*) that may have been associated with the swamp forest, and Newhous (personal communication 1976) also encountered the plant while clearing vegetation to build Wakerobin Trail in the 1920's. I found none in my study.

Mentor Marsh is presently covered by herbaceous marsh vegetation over much of its area. *Typha latifolia* and *T. angustifolia* were originally the two dominant types of marsh vegetation after the die-off. *P. australis* has rapidly multiplied so that it is now the dominant marsh plant. At the time of my study, it covered 60% to 70% of the marsh. *Phragmites australis*, formerly *P. phragmites* or *P. communis* (Clayton 1968), is a plant that was common to Ohio's wet prairies (Sears 1926, Gordon 1969), and still can be found in relict Ohio prairies. Aldrich (1943) lists it as a secondary dominant in the swamp prairie. Jennings (1908) found *P. australis* at Cedar Point, Ohio in close association with *T. latifolia*, and Sears (1916) found almost homogenous stands at the same location. Dachnowski (1912) also found extensive evidence of the presence of *P. australis* throughout Ohio. It is, therefore, probable that *P. australis* was present near Mentor Marsh at the time it separated from the Grand River. After establishment in the proper conditions (Gordon 1966, Haslam 1971a, b; van der Toorn 1972), *P. australis* proliferates and is difficult to eradicate.

In Holland, where *P. australis* is used in land reclamation projects on land that was formerly ocean bottom, it is useful in removing salt from soil and creating suitable substrate for terrestrial plants (Newhous 1976). In such a recently disturbed area, the invasion and growth of *P. australis* in a land reclamation project took place spontaneously and resulted in dense vegetation within a few years. Perhaps this is similar to the situation that occurred in Mentor Marsh after the die-off disturbed the natural succession in the area.

*Typha latifolia* is usually found in deeper water than *T. angustifolia*, and *Phragmites australis* is found in the driest habitat (Sears 1916). I believe that this is the sequence of biotic succession within the marsh. Studies by Keefe (1974) and Jones (1975) indicate that salt concentration is greatest where Black Brook enters the marsh and that salt concentration gradually decreases to the west. The most uniform stands of *P. australis* are in the southeastern portion of the marsh where salt concentration is the highest. Therefore, *P. australis* would be expected to have a greater salt tolerance than the *Typha* species. This is, indeed, the case (Penfound and Hathaway 1938, Rechav 1967, van der Toorn 1972).

Currently, *Phragmites australis* occurs mainly in monodominant stands with thick litter in Mentor Marsh. I found no plants within the stands that would be capable of competition. It is possible that salt concentration has prevented invasion. With salt leakage supposedly decreasing due to preventative measures by local industries, it is possible that *P. australis* could remove enough salt from the area to enable other species to become established within the marsh. Further studies will be needed to determine the future of the marsh.

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