Overview: This community is a wetland dominated by tall graminoid plants that are salt tolerant. The vegetation may be sparse with areas of bare mud.

Global and State Rank: G1/S1.


Rank Justification: Inland salt marsh was always a rare community with only local occurrences in the eastern United States, but postsettlement exploitation destroyed most known sites (Chapman et al. 1985). While the plant community was known from Illinois, Michigan, Missouri, New York, Ohio, Pennsylvania, and Virginia, it persists only in Illinois, Michigan, and New York. Known salt seepages throughout this range have been surveyed for inland salt marsh (Chapman et al. 1985). However, most sites with saline or brine seeps do not support halophytes (salt tolerant vegetation) and few additional occurrences are expected to be discovered.

Landscape and Abiotic Context: This community occurs on peat, muck, or mineral soils saturated by sodium- or chlorine-rich groundwater seeping from saline aquifers (Faber-Langendoen 2001, NatureServe 2001). These sites are most common along streams or rivers where glacial drift is thin enough to permit brine from deep saline aquifers to remain concentrated and emerge at discrete points. In Michigan, salt marshes and seeps were concentrated in three areas where Silurian or Devonian halites (rock salt deposits) were near the surface. The greatest concentration of sites was along the floodplain and slopes adjacent to the Maple River and Grand River, where there are Silurian halites. Our only intact salt marshes occur in this area, along the Maple River in northern Clinton County. A second concentration of Salurian salt seeps occurred near Lake St. Clair and Lake Erie in Macomb, Monroe, St. Clair, Washtenaw, and Wayne counties. None of these remain intact. A third large concentration of Devonian salt seeps occurred in Midland and Saginaw counties. No intact salt marshes remain from this group of wetlands.

Soils of the Maple River salt marsh were sampled and found to be high in several ions, including sodium, chloride, potassium, calcium, and magnesium (Chapman et al. 1985). The pH ranged from 5.8 to 8.0 within the marsh.

Historically, there has always been strong interest in salt marshes. To the aboriginal populations, salt seeps were important as sites visited by deer and other wild animals (Houghton 1838, Chapman et al. 1985). Salt marshes were also known to early settlers from Europe, who called them deer licks, salt licks, salt springs, and natural brine (Chapman et al. 1985). Salt was an important preservative for food as the Midwest and West were being settled, so most salt seeps were heavily exploited (Winchell 1861, Cook 1914, Allen 1918, Gere 1974).

Natural Processes: Inland salt marshes form where salt-rich seeps emerge to the surface from glacial deposits.
**Legend**

- Counties
- **Section**
- **Subsection**
- Sub-subsection

**Landscape Ecosystems of Michigan**

- Green: Prevalent or likely prevalent
- Light Green: Infrequent or likely infrequent
- White: Absent or likely absent

Ecoregional map of Michigan (Albert 1995) depicting historical distribution of inland salt marsh (Albert et al. 2008)
(Kost et al. 2007). A limited number of wetland species can tolerate the high salt levels and wetland soils develop over time. Open, unvegetated sediments are often found within the wetland, either because of extreme saline conditions or because of disturbance from animals seeking salts. At the Maple River salt marsh, there was strong evidence that deer were responsible for the open sediment within the marsh (D. Albert, personal observation). Deer tracks were dense in the moist, organic-rich sediment of the unvegetated opening (see photo).

There is evidence that birds may have played a role in the introduction of halophytes inland from the extensive saline habitats of the Atlantic coast (Ogle 1981, Chapman et al. 1985). Salty habitats created by humans through brine drilling and road salting sometimes support halophytes, either through accidental or intentional introduction (Reznicek 1980, Chapman et al. 1985). Such artificial habitats are not tracked in the MNFI database.

The amount of seepage within the salt marshes can vary greatly, both seasonally and annually. On some mid-summer visits to the Maple River salt marsh by the author, deep water covered the entire marsh. In other years the marsh was dry, with the exception of shallow water in areas disturbed by deer and other animals.

Fire may have been important for maintaining the open conditions required by most plant species found in salt marshes (Chapman et al. 1985). While fires may have occurred naturally in some salt marshes, Native American use of fire for either agricultural or game management may have also been significant at many sites.

Vegetation Description: Because occurrences are small and widely scattered, each site tends to have a distinct composition (Faber-Langendoen 2001, NatureServe 2001). Dominant species vary from marsh to marsh, and eastern sites are richer in halophytic species than western sites. Species that are found across the range of the community are *Atriplex patula* (spearscale) and *Eleocharis parvula* (dwarf spike-rush). The number of species found within the halozone is always low (Chapman et al. 1985, Reschke 1990, Faber-Langendoen 2001, NatureServe 2001); sodium chloride-saturated ground creates intolerable conditions for most vascular plants.

At the Maple River salt marshes, eight species were found only in the halozone. These were:

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Alisma plantago-aquatica</em></td>
<td>water-plantain</td>
</tr>
<tr>
<td><em>Eleocharis parvula</em></td>
<td>dwarf spike-rush</td>
</tr>
<tr>
<td><em>Eleocharis erythropoda</em></td>
<td>spike-rush</td>
</tr>
<tr>
<td><em>Phragmites australis</em></td>
<td>giant reed</td>
</tr>
<tr>
<td><em>Portulaca oleracea</em></td>
<td>purslane</td>
</tr>
<tr>
<td><em>Samois floribundus</em></td>
<td>water-pimpernel</td>
</tr>
<tr>
<td><em>Schoenoplectus americanus</em></td>
<td>three-square bulrush</td>
</tr>
<tr>
<td><em>Sium suave</em></td>
<td>water-parsnip</td>
</tr>
</tbody>
</table>

Other species found within the both the halozone and other zones of the wetlands include:

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acorus calamus</em></td>
<td>sweet-flag</td>
</tr>
<tr>
<td><em>Aster lanceolatus</em></td>
<td>paniced aster</td>
</tr>
<tr>
<td><em>Atriplex patula var. hastata</em></td>
<td>spearscale</td>
</tr>
<tr>
<td><em>Eupatorium perfoliatum</em></td>
<td>boneset</td>
</tr>
<tr>
<td><em>Mentha arvensis</em></td>
<td>wild mint</td>
</tr>
<tr>
<td><em>Schoenoplectus pungens</em></td>
<td>three-square</td>
</tr>
<tr>
<td><em>Typha angustifolia</em></td>
<td>narrow-leaved cat-tail</td>
</tr>
<tr>
<td><em>Typha latifolia</em></td>
<td>broad-leaved cat-tail</td>
</tr>
</tbody>
</table>

**Michigan Indicator Species:** *Atriplex patula* var. *hastata*, *Eleocharis parvula* (state endangered), *Schoenoplectus americanus* (state endangered), and *Schoenoplectus pungens*.

**Other Noteworthy Species:** Two rare plant species, *Eleocharis parvula* (dwarf spike-rush, state endangered) and *Schoenoplectus americanus* (three-square bulrush, state endangered), are known from this plant community in Michigan.

**Conservation/Management:** The amount of open seepage at the Maple River salt marshes has decreased...
significantly over the last twenty-five years of observation. Fire may have been important for maintaining open conditions within the salt marsh, with fire originating in the upland forest near the salt marsh. It is assumed that upland fires probably carried into the marshes, where herbaceous cover is probably dense enough to carry fire. Without fire, the herbaceous vegetation cover in the Maple River salt marshes has become quite dense, possibly resulting in the loss of some of the halophites known from the site; *Eleocharis parvula* has not been found in surveys during the last fifteen years.

**Research Needs:** Further research on hydrological restoration is needed for degraded systems. Research on the effects of fire is needed for the Maple River site. There is also need for faunal inventories of invertebrates and herptiles. Revisits of vegetation transects (Chapman et al. 1985) could allow for monitoring of temporal changes in vegetation.

**Similar Communities:** emergent marsh, southern wet meadow.

**Other Classifications:**

**Michigan Natural Features Inventory (MNFI)**

Presettlement Vegetation: 6225 (Inland Salt Marsh)

**Michigan Department of Natural Resources (MDNR):** N (marsh)

**Michigan Resource Information Systems (MIRIS):** 622 (Emergent wetland)


**Related Abstracts:** Southern wet meadow.

**Selected References:**


**Abstract citation:**


Updated June 2010.

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Michigan State University Extension is an affirmative-action, equal-opportunity organization.

Funding for abstract provided by Michigan Department of Natural Resources-Forest Management Division and Wildlife Division.