Ecological site R104XY001IA
Organic Sedge Meadow

Last updated: 5/18/2020
Accessed: 09/22/2026

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 104X–Eastern Iowa and Minnesota Till Prairies

The Eastern Iowa and Minnesota Till Prairies (MLRA 104) includes the Iowan Surface, Oak Savanna, and Western Coulee and Ridges landforms (Prior 1991; MDNR 2005; WDNR 2015). It spans three states (Iowa, 74 percent; Minnesota, 22 percent; Wisconsin, 4 percent), encompassing approximately 9,660 square miles (Figure 1). The elevation ranges from approximately 1,310 feet above sea level (ASL) on the highest ridges to about 985 feet ASL in the lowest valleys. Local relief is mainly 10 to 20 feet. Glacial till and outwash deposits cover the uplands of the MLRA with recent alluvium located in the major river valleys. Paleozoic bedrock sediments, comprised primarily of shale and limestone, lies beneath the glacial material. The depth to limestone is shallow, resulting in karst topography across much of the area (USDA-NRCS 2006). The vegetation in the MLRA has undergone drastic changes over time. Spruce forests dominated the landscape 30,000 to 21,500 years ago. As the last glacial maximum peaked 21,500 to 16,000 years ago, they were replaced with open tundras and parklands. The end of the Pleistocene Epoch saw a warming climate that initially prompted the return of spruce forests, but as the warming continued, spruce trees were replaced by deciduous trees (Baker et al. 1990). Not until approximately 9,000 years ago did the vegetation transition to prairies as climatic conditions continued to warm and subsequently dry. Between 4,000 and 3,000 years ago, oak savannas began intermingling within the prairie landscape, while the more wooded and forested areas maintained a foothold in sheltered areas. This prairie-forest transition ecosystem formed the dominant landscapes until the arrival of European settlers (Baker et al. 1992).

Classification relationships

USFS Subregions: North Central U.S. Driftless and Escarpment (222L), Minnesota and Northeast Iowa Morainal-Oak Savannah (222M), Central Dissected Till Plains (251C) Sections; Menominee Eroded Pre-Wisconsin Till (222La), Oak Savannah Till and Loess Plains (222Me), Southeast Iowa Rolling Loess Hills (251Ch) Subsections (Cleland et al. 2007) U.S. EPA Level IV Ecoregion: Eastern Iowa and Minnesota Drift Plains (47c), Rolling Loess Prairies (47f), Lower St. Croix and Vermillion Valleys (47g), Rochester/Paleozoic Plateau Upland (52c) (USEPA 2013) National Vegetation Classification - Plant Associations: Carex stricta – Valeriana edulis – Parnassia palustris Fen (CEGL005241) (Nature Serve 2015) Biophysical Settings: Central Interior and Appalachian Shrub-Herbaceous Wetland Systems (BpS 4314930) (LANDFIRE 2009) Natural Resources Conservation Service – Iowa Plant Community Species List: Fen, Tussock Sedge (USDA-NRCS 2007) Iowa Department of Natural Resources: Sedge Fen (INAI 1984) Minnesota Department of Natural Resources: OPp93c Calcareous Fen (Southeastern) (MDNR 2005) U.S. Army Corps of Engineers: Calcareous Fens (Eggers and Reed 2015)

Ecological site concept

Organic Sedge Meadows are located within the green areas on the map (Figure 1). They occur on upland backslopes. The soils are Histosols that are very poorly-drained and deep, formed in organic material. A shallow depth to the water table results in saturated soil conditions throughout the year. The historic pre-European settlement vegetation on this ecological site was dominated by highly-diverse hydrophytic herbaceous vegetation. Upright sedge (Carex stricta Lam.) and eastern marsh fern (Thelypteris palustris Schott) are the dominant species of Organic Sedge Meadows. Other monocots likely to be present include bluejoint (Calamagrostis canadensis (Michx.) P. Beauv), spiked muhly (Muhlenbergia glomerata (Willd.) Trin.), and numerous sedges. Other vascular plants typical of an undisturbed plant community associated with this ecological site include yellow marsh marigold (Caltha palustris L.), fen grass of Parnassus (Parnassia glauca Raf.), and tobacco root (Valeriana edulis Nutt. ex Torr. & A. Gray) (Drobney et al. 2001). Constant groundwater discharge is the primary disturbance factor that maintains this site, while occasional fire and drought are secondary disturbances (LANDFIRE 2009).

Associated sites

R104XY006IA	**Wet Loamy Upland Prairie** Wet Loamy Upland Prairie

Similar sites

R104XY012IA	**Wet Upland Drainageway Sedge Meadow** Wet Upland Drainageway Sedge Meadow
R104XY013IA	**Ponded Upland Depression Sedge Meadow** Ponded Upland Depression Sedge Meadow

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Carex stricta* (2) *Thelypteris palustris*

Physiographic features

Organic Sedge Meadows occur on upland backslopes. They are situated on elevations ranging from approximately 249 to 1499 feet ASL. The site does not experience flooding, but rather is continuously saturated due to groundwater discharge moving laterally throughout the soil and discharging along hillsides.

Figure 1. Figure 1. Location of Organic Sedge Meadow ecological site within MLRA 104.

Table 2. Representative physiographic features

Slope shape across	(1) Concave (2) Convex
Slope shape up-down	(1) Concave (2) Convex
Hillslope profile	(1) Backslope
Landforms	(1) Upland
Runoff class	Negligible to very low

Ponding frequency	Rare to occasional
Elevation	80 – 460 m
Slope	0 – 10 %
Aspect	Aspect is not a significant factor

Climatic features

The Eastern Iowa and Minnesota Till Prairies falls into the hot-summer humid continental climate (Dfa) and warm-summer humid continental climate (Dfb) Köppen-Geiger climate classifications (Peel et al. 2007). In winter, dry, cold air masses periodically shift south from Canada. As these air masses collide with humid air, snowfall and rainfall result. In summer, moist, warm air masses from the Gulf of Mexico migrate north, producing significant frontal or convective rains. Occasionally, hot, dry winds originating from the Desert Southwest will stagnate over the region, creating extended droughty periods in the summer from unusually high temperatures. Air masses from the Pacific Ocean can also spread into the region and dominate producing mild, dry weather in the autumn known as Indian Summers (NCDC 2006).

The soil temperature regime of MLRA 104 is classified as mesic, where the mean annual soil temperature is between 46 and 59°F (USDA-NRCS 2006). Temperature and precipitation occur along a north-south gradient, where temperature and precipitation increase the further south one travels. The average freeze-free period of this ecological site is about 153 days, while the frost-free period is about 129 days. The majority of the precipitation occurs as rainfall in the form of convective thunderstorms during the growing season. Average annual precipitation is approximately 36 inches, which includes rainfall plus the water equivalent from snowfall. The average annual low and high temperatures are 35 and 55°F, respectively.

Climate data and analyses are derived from 30-year averages gathered from five National Oceanic and Atmospheric Administration (NOAA) weather stations contained within the range of this ecological site.

Table 3 Representative climatic features

Frost-free period (characteristic range)	130-130 days
Freeze-free period (characteristic range)	140-160 days
Precipitation total (characteristic range)	890-970 mm
Frost-free period (actual range)	120-140 days
Freeze-free period (actual range)	140-170 days
Precipitation total (actual range)	860-970 mm
Frost-free period (average)	130 days
Freeze-free period (average)	150 days

Precipitation total (average)	910 mm

- (1) GRAND MEADOW [USC00213290], Grand Meadow, MN
- (2) AUSTIN WWT FAC [USC00210355], Austin, MN
- (3) NEW HAMPTON [USC00135952], New Hampton, IA
- (4) ALLISON [USC00130157], Allison, IA
- (5) FAYETTE [USC00132864], Fayette, IA

Influencing water features

Organic Sedge Meadows are classified as a SLOPE: groundwater influenced, discharge, herbaceous wetland under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008) and as a Palustrine, Persistent, Emergent, Continuously Saturated wetland under the National Wetlands Inventory (FGDC 2013). Groundwater discharge from a perched water table is the main source of water for this ecological site (Smith et al. 1995). Infiltration is very slow (Hydrologic Group D) for undrained soils, and surface runoff is negligible to very low (Figure 4).

Primary wetland hydrology indicators for an intact Organic Sedge Meadow may include: A2 High water table and A3 Saturation. Secondary wetland hydrology indicators may include: C2 Dry-season water table and D5 FAC-neutral test (USACE 2010).

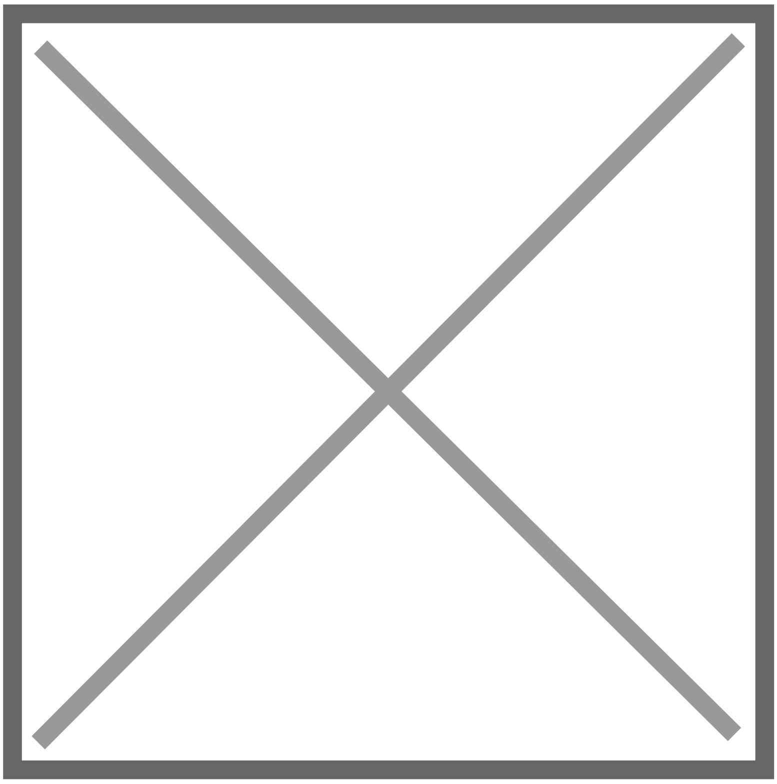

Figure 8. Figure 4. Hydrologic cycling in Organic Sedge Meadow ecological site.

Soil features

Soils of Organic Sedge Meadows are in the Histosols order, further classified as Terric Haplosaprists and Typic Haplosaprists with very slow infiltration and negligible to very low runoff potential. The soil series associated with this site includes Houghton, Klossner, Medo, and Palms and muck soils. The parent material is organic material, and the soils are very poorly-drained and deep. A shallow water table results in saturated soils conditions throughout the year. Soil pH classes are strongly acid to moderately alkaline. No rooting restrictions are noted for the soils of this ecological site (Table 5).

Some soil map units in this ecological site, if not drained, may meet the definition of hydric soils and are listed as meeting criteria 1 of the hydric soils list (77 FR 12234).

Figure 9. Figure 5. Profile sketches of soil series associated with Organic Sedge Meadow.

Table 4. Representative soil features

Parent material	(1) Organic material
Drainage class	Very poorly drained
Permeability class	Slow
Depth to restrictive layer	200 cm
Soil depth	200 cm

Ecological dynamics

The MLRA lies within the transition zone between the eastern deciduous forests and the tallgrass prairies. The heterogeneous topography of the area results in variable microclimates and fuel matrices that in turn support prairies, savannas, woodlands, and forests. Organic Sedge Meadow form an aspect of this vegetative continuum. This ecological site occurs on upland backslopes on very poorly-drained organic soils. A shallow water table results in saturated soil conditions throughout the year. Species characteristic of this ecological site consist of hydrophytic herbaceous vegetation.

Organic Sedge Meadows are dependent on consistent groundwater discharge. These conditions are present where surface slopes intersect a perched water table, allowing the groundwater to slowly seep from the hillside (Richardson and Brinson 2001; Dixon 2014). While water levels may fluctuate throughout the year, they generally remain at or near the soil surface (LANDFIRE 2009). The near-constant anaerobic conditions maintain the herbaceous wetland plant community and prevent woody species from encroaching.

Drought and fire have also played a role in shaping this ecological site. The periodic episodes of reduced soil moisture in conjunction with the very poorly-drained soils have favored the proliferation of plant species tolerant of such conditions. Drought can also slow the growth of plants and result in dieback of certain species. Occasional fires reduced plant litter and aided in preventing declines in species richness. Drought coupled with fire would keep woody plants from encroaching (LANDFIRE 2009).

Today, Organic Sedge Meadows have been greatly reduced as sites have been converted to agricultural production lands or converted to ponds. Sites that have not been directly altered show evidence of indirect anthropogenic influences from hydrologic alterations, fire suppression, and non-native species invasion (Pearson and Leoschke 1992). These land conversions and alterations to the natural groundwater flow are considered irreversible, making restoration an improbability. The state-and-transition model that follows provides a detailed description of each state, community phase, pathway, and transition. This model is based on available experimental research, field observations, literature reviews, professional consensus, and interpretations.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 3.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 13. Community 4.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 14. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Inventory data references

Tier 3 Sampling Plots used to develop the reference state, community phase 1.1: State County Ownership Easting Northing Iowa Buchanan Rowley Fen – Buchanan County Conservation Board 594031 4559424 Iowa Marshall Marietta Sand Prairie Preserve – Marshall County Conservation Board 497148 4660971 Iowa Black Hawk Cedar Hills Sand Prairie – The Nature Conservancy 536713 4715854 Iowa Fayette Kauten Fen – The Kauten Family 599089 4737395 Iowa Butler Leeper Prairie Preserve – Butler County Conservation Board 525123 4731466

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Approval

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	09/22/2026
Approved by	
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
