

Ecological site R110XY022IL

Organic Sand Seep

Last updated: 4/22/2020
Accessed: 09/02/2026

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): 110X–Northern Illinois and Indiana Heavy Till Plain

The Northern Illinois and Indiana Heavy Till Plain (MLRA 110) encompasses the Northeastern Morainal, Grand Prairie, and Southern Lake Michigan Coastal landscapes (Schwegman et al. 1973, WDNR 2015). It spans three states – Illinois (79 percent), Indiana (10 percent), and Wisconsin (11 percent) – comprising about 7,535 square miles (Figure 1). The elevation is about 650 feet above sea level (ASL) and increases gradually from Lake Michigan south. Local relief varies from 10 to 25 feet. Silurian age fractured dolomite and limestone bedrock underlie the region. Glacial drift covers the surface area of the MLRA, and till, outwash, lacustrine deposits, loess or other silty material, and organic deposits are common (USDA-NRCS 2006). The vegetation in the MLRA has undergone drastic changes over time. At the end of the last glacial episode – the Wisconsinan glaciation – the evolution of vegetation began with the development of tundra habitats, followed by a phase of spruce and fir forests, and eventually spruce-pine forests. Not until approximately 9,000 years ago did the climate undergo a warming trend which prompted the development of deciduous forests dominated by oak and hickory. As the climate continued to warm and dry, prairies began to develop approximately 8,300 years ago. Another shift in climate that resulted in an increase in moisture prompted the emergence of savanna-like habitats from 8,000 to 5,000 years before present (Taft et al. 2009). Forests maintained footholds on steep valley sides, morainal ridges, and wet floodplains. Fire, droughts, and grazing by native mammals helped to maintain the prairies and savannas until the arrival of European settlers, and the forests were maintained by droughts, wind, lightning, and occasional fire (Taft et al. 2009; NatureServe 2018).

Classification relationships

USFS Subregions: Southwestern Great Lakes Morainal (222K) and Central Till Plains and Grand Prairies (251D) Sections; Kenosha-Lake Michigan Plain and Moraines (222Kg), Valparaiso Moraine (Kj), and Eastern Grand Prairie (251Dd) Subsections (Cleland et al. 2007) U.S. EPA Level IV Ecoregion: Kettle Moraines (53b), Illinois/Indiana Prairies (54a), and Valparaiso-Wheaton Morainal Complex (54f) (USEPA 2013) Illinois Natural Areas Inventory: Sand Seep (White and Madany 1978)

Ecological site concept

Organic Sand Seeps are located within the green areas on the map. They occur on depressions on outwash plains. The soils are Histosols that are very poorly drained and very deep, formed in organic material over sandy outwash or glaciolacustrine deposits. The historic pre-European settlement vegetation on this ecological site was dominated by hydrophytic woody and herbaceous vegetation. Fowl mannagrass (*Glyceria striata* (Lam.) Hitchc.) and common ladyfern (*Athyrium filix-femina* (L.) Roth) are characteristic herbaceous species of the site, and common ninebark (*Physocarpus opulifolius* (L.) Maxim., orth.cons.) is a characteristic shrub. Species indicative of an undisturbed plant community associated with this ecological site include cinnamon fern (*Osmunda cinnamomea* L.), royal fern (*Osmunda regalis* L.), and spinulosa woodfern (*Dryopteris carthusiana* (Vill.) H.P. Fuchs) (White and Madany 1978; Taft et al. 1997). Acidic groundwater seepage flowing through sand is the primary disturbance factor that maintains this site, while drought and fire are secondary disturbances.

Associated sites

R110XY015IL	Wet Sand Prairie Outwash parent material that is shallow to a high-water table including Fieldon, Gilford, Granby, Granby variant, Hoopole, and Mussey soils
--------------------	--

Similar sites

R110XY023IL	Organic Interdunal Fen Organic Intertidal Fens are a similar vegetation type, but the site is a LACUSTRINE FRINGE wetland
-------------	---

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Physocarpus opulifolius</i>
Herbaceous	(1) <i>Glyceria striata</i> (2) <i>Athyrium filix-femina</i>

Physiographic features

Organic Sand Seeps occur on depressions on outwash plains. They are situated on elevations ranging from approximately 541 to 935 feet ASL. The site does not experience flooding, but rather is continuous saturated to ponded with acidic groundwater seepage

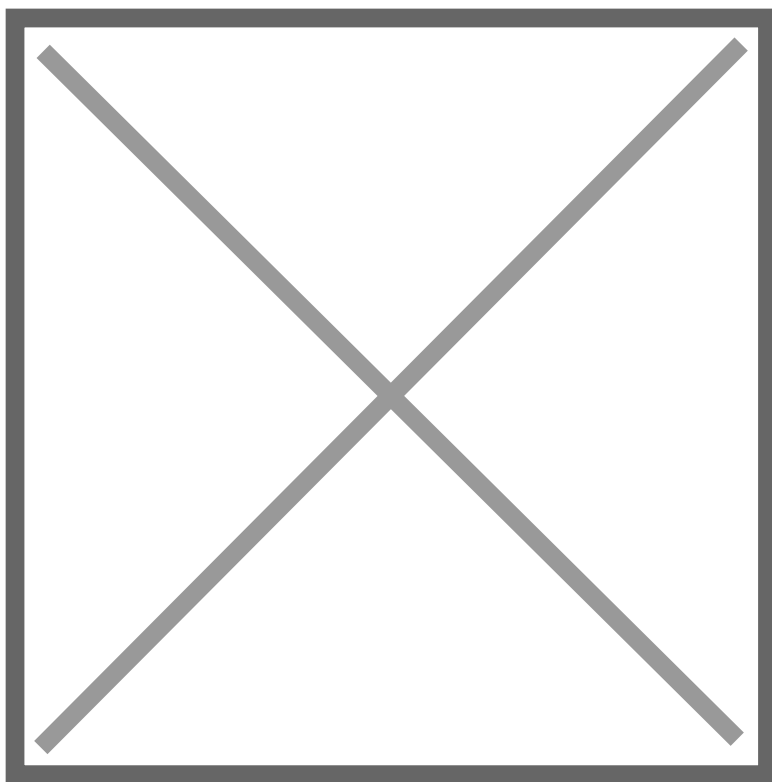


Figure 1.

Table 2. Representative physiographic features

Slope shape across	(1) Concave
Slope shape up-down	(1) Concave

Landforms	(1) Outwash plain
Runoff class	Negligible
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	170 – 290 m
Slope	0 %
Ponding depth	0 – 30 cm
Water table depth	10 – 20 cm
Aspect	Aspect is not a significant factor

Climatic features

The Northern Illinois and Indiana Heavy Till Plain falls into the hot-summer humid continental climate (Dfa) and warm-summer humid continental climate (Dfb) Köppen-Geiger climate classifications (Peel et al. 2007). The two main factors that drive the climate of the MLRA are latitude and weather systems. Latitude, and the subsequent reflection of solar input, determines air temperatures and seasonal variations. Solar energy varies across the seasons, with summer receiving three to four times as much energy as opposed to winter. Weather systems (air masses and cyclonic storms) are responsible for daily fluctuations of weather conditions. High-pressure systems are responsible for settled weather patterns where sun and clear skies dominate. In fall, winter, and spring, the polar jet stream is responsible for the creation and movement of low-pressure systems. The clouds, winds, and precipitation associated with a low-pressure system regularly follow high-pressure systems every few days (Angel n.d.).

The soil temperature regime of MLRA 110 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 174 days, while the frost-free period is about 137 days (Table 2). The majority of the precipitation occurs as rainfall in the form of convective thunderstorms during the growing season. Average annual precipitation is 39 inches, which includes rainfall plus the water equivalent from snowfall (Table 3). The average annual low and high temperatures are 40.7 and 60.4°F, respectively.

Table 3 Representative climatic features

Frost-free period (characteristic range)	130-140 days
Freeze-free period (characteristic range)	170-180 days
Precipitation total (characteristic range)	970-990 mm
Frost-free period (actual range)	130-140 days

Freeze-free period (actual range)	170-180 days
Precipitation total (actual range)	970-990 mm
Frost-free period (average)	140 days
Freeze-free period (average)	170 days
Precipitation total (average)	990 mm

- (1) WATSEKA 2 NW [USC00119021], Watseka, IL
- (2) KANKAKEE WASTEWATER [USC00114603], Kankakee, IL
- (3) MORRIS 1 NW [USC00115825], Morris, IL

Influencing water features

Organic Sand Seeps are classified as a SLOPE: discharge, ponded, 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 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.

Wetland description

Primary wetland hydrology indicators for an intact Organic Sand Seep 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).

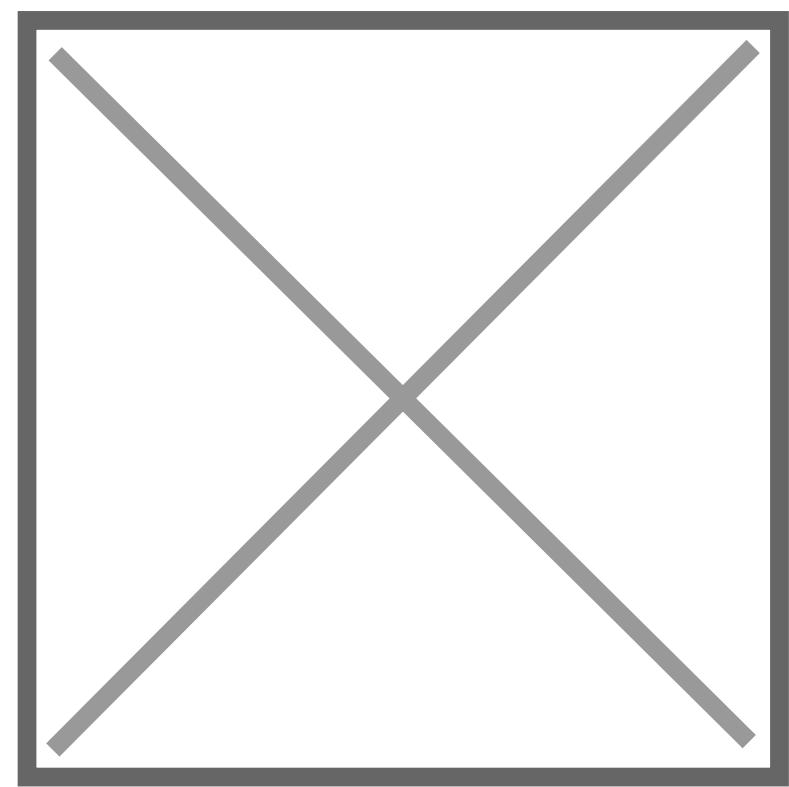


Figure 8. Hydrologic cycling in Organic Sand Seep ecological site.

Soil features

Soils of Organic Sand Seeps are in the Histosols and Inceptisols orders, further classified as Terric Haplosaprists and Histic Humaquepts with very slow infiltration and negligible runoff potential. The soil series associated with this site includes Adrian and Aurelius. The parent material is organic matter over sandy outwash or glaciolacustrine deposits, and the soils are very poorly drained and very deep with seasonal high-water tables. Soil pH classes are strongly acid to moderately alkaline. No rooting restrictions are noted for the soils of this ecological site.

Some soil map units in this ecological site, if not drained, may meet the definition of hydric soils and are listed as meeting criteria 2 or 4 of the hydric soils list (77 FR 12234).

Figure 9. Profile sketches of soil series associated with Organic Sand Seep.

Table 4. Representative soil features

Parent material	(1) Organic material
Family particle size	(1) Sandy or sandy-skeletal
Drainage class	Very poorly drained
Permeability class	Very slow to slow
Depth to restrictive layer	200 cm
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	17.78 – 40.64 cm
Calcium carbonate equivalent (Depth not specified)	0 – 40 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified

Soil reaction (1:1 water) (Depth not specified)	6.1 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The information in this Ecological Site Description, including the state-and-transition model (STM), was developed based on historical data, current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

The MLRA lies within the tallgrass prairie ecosystem of the Midwest, but a variety of environmental and edaphic factors resulted in landscape that historically supported prairies, savannas, forests, and various wetlands. Organic Sand Seeps form an aspect of this vegetative continuum. This ecological site occurs on depressions on outwash plains on very poorly drained soils. Species characteristic of this ecological site consist of hydrophytic woody and herbaceous vegetation.

Organic Sand Seeps are dependent on consistent groundwater discharge. The water is generally acidic, as it flows through nutrient poor sand.

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 and dominance of shrubby species.

Today, Organic Sand Seeps have been greatly reduced as sites have been type-converted to agricultural or other human-modified landscape. Restoration of these sites back to the historic conditions may be improbable as landscape level hydrologic alterations are likely permanent. 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 2.3 plant community composition

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

Table 9. Community 3.1 plant community composition

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

Inventory data references

No field plots were available for this site. A review of the scientific literature and professional experience were used to approximate the plant communities for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional based on these plots and the sources identified in this ecological site description.

Other references

Angel, J. No date. Climate of Illinois Narrative. Illinois State Water Survey, Prairie Research Institute, University of Illinois at Urbana-Champaign. Available at <https://www.isws.illinois.edu/statecli/General/Illinois-climate-narrative.htm>. Accessed 8 November 2018.

Changes in Hydric Soils Database Selection Criteria. 77 Federal Register 12234 (29 February 2012), pp. 12234-12235.

Cleland, D.T., J.A. Freeouf, J.E. Keys, G.J. Nowacki, C. Carpenter, and W.H. McNab. 2007. Ecological Subregions: Sections and Subsections of the Conterminous United States. USDA Forest Service, General Technical Report WO-76. Washington, DC. 92 pps.

Federal Geographic Data Committee. 2013. Classification of Wetlands and Deepwater Habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal geographic Data Committee and U.S. Fish and Wildlife Service, Washington, D.C. 90 pps.

Leake, J., D. Johnson, D. Donnelly, G. Muckle, L. Boddy, and D. Read. 2004. Networks of power and influence: the role of mycorrhizal mycelium in controlling plant communities and agroecosystem functioning. *Canadian Journal of Botany* 82: 1016-1045.

Peel, M.C., B.L. Finlayson, and T.A. McMahon. 2007. Updated world map of the Köppen-Geiger climate classification. *Hydrology and Earth System Sciences* 11: 1633-1644.

Schwegman, J.E., G.B. Fell, M. Hutchinson, G. Paulson, W.M. Shepherd, and J. White. 1973. Comprehensive Plan for the Illinois Nature Preserves System, Part 2 The Natural Divisions of Illinois. Illinois Nature Preserves Commission, Rockford, IL. 32 pps.

Smith, R.D., A. Ammann, C. Bartoldus, and M.M. Brinson. 1995. An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices. U.S. Army Corps of Engineers, Waterways Experiment Station, Wetlands Research Program Technical Report WRP-DE-9. 78 pps.

Taft, J.B., G.S. Wilhelm, D.M. Ladd, and L.A. Masters. 1997. Floristic Quality Assessment for vegetation in Illinois, a method for assessing vegetation integrity. *Erigenia* 15: 3-95.

Taft, J.B., R.C. Anderson, L.R. Iverson, and W.C. Handel. 2009. Chapter 4: Vegetation ecology and change in terrestrial ecosystems. In: C.A. Taylor, J.B. Taft, and C.E. Warwick (eds.). *Canaries in the Catbird Seat: The Past, Present, and Future of Biological Resources in a Changing Environment*. Illinois Natural Heritage Survey Special Publication 30, Prairie Research Institute, University of Illinois at Urbana-Champaign. 306 pps.

Tomer, M.D., D.W. Meek, and L.A. Kramer. 2005. Agricultural practices influence flow regimes of headwater streams in western Iowa. *Journal of Environmental Quality* 34:1547-1558.

U.S. Army Corps of Engineers [USACE]. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0). U.S. Army Corps of Engineers, Wetlands Regulatory Assistance Program, U.S. Army Engineer Research and Development Center, Vicksburg, MS. 141 pps.

United States Department of Agriculture – Natural Resource Conservation Service (USDA-NRCS). 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. 682 pps.

United States Department of Agriculture – Natural Resource Conservation Service (USDA-NRCS). 2008. Hydrogeomorphic Wetland Classification: An Overview and Modification to Better Meet the Needs of the Natural Resources Conservation Service. Technical Note No. 190-8-76. Washington, D.C. 8 pps.

U.S. Environmental Protection Agency [EPA]. 2013. Level III and Level IV Ecoregions of the Continental United States. Corvallis, OR, U.S. EPA, National Health and Environmental Effects Research Laboratory, map scale 1:3,000,000. Available at <http://www.epa.gov/ecoresearch/level-iii-and-iv-ecoregions-continental-united-states>. (Accessed 1 March 2017).

White, J. and M.H. Madany. 1978. Classification of natural communities in Illinois. In: J. White. *Illinois Natural Areas Inventory Technical*

Wisconsin Department of Natural Resources [WDNR]. 2015. The Ecological Landscapes of Wisconsin: An Assessment of Ecological Resources and a Guide to Planning Sustainable Management. Wisconsin Department of Natural Resources, PUB-SS-1131 2015, Madison, WI. 293 pps.

Contributors

Lisa Kluesner
Kristine Ryan
Sarah Smith
Tiffany Justus

Approval

Chris Tecklenburg, 4/22/2020

Acknowledgments

This project could not have been completed without the dedication and commitment from a variety of staff members. Team members supported the project by serving on the technical team, assisting with the development of state and community phases of the state-and-transition model, providing peer review and technical editing, and conducting quality control and quality assurance reviews. List of primary contributors and reviewers. Organization Name Title Location Natural Resources Conservation Service Ron Collman State Soil Scientist Champaign, IL Tonie Endres Senior Regional Soil Scientist Indianapolis, IN Tiffany Justus Soil Scientist Aurora, IL Lisa Kluesner Ecological Site Specialist Waverly, IA Rick Neilson State Soil Scientist Indianapolis, IN Jason Nemecek State Soil Scientist Madison, WI Kevin Norwood Soil Survey Regional Director Indianapolis, IN Kristine Ryan MLRA Soil Survey Leader Aurora, IL Stanley Sipp Resource Inventory Specialist Champaign, IL Sarah Smith Soil Scientist Aurora, IL Chris Tecklenberg Acting Regional Ecological Site Specialist Hutchinson, KS

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	09/02/2026
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:

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

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

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

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:

17. Perennial plant reproductive capability:
