

Ecological site F097XB003IN

Chicago Backdune

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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): 097X–Southwestern Michigan Fruit and Vegetable Crop Belt

Physiography consists of sandy lake plains and dunes along the western side adjacent to Lake Michigan, and moderately sloping fine-loamy moraine from the Lake Michigan lobe of the Wisconsin Ice Sheet. Vegetation is mostly mesophytic forests of central and northern hardwood and conifer species with prairie and oak savanna to the south. Compared to inland locations, cold sensitive hardwood species extend further north due to milder winters, and conifers extend further south due to cooler summers, heavier snowfall, and sandier soils. Lake effect snow and delayed spring warm up dampen the fire frequency relative to similar inland sites, except along the south side of Lake Michigan. The northern extent is defined by a major floristic boundary where several central hardwoods species drop out. The southern boundary is defined by fine-loamy moraines with predominantly prairie vegetation. The ecological site inference area for MLRA 97 is subdivided along a floristic/climatic break roughly from New Buffalo, Michigan to Portage, Indiana. This corresponds to the heaviest lake effect snow belt (>160 cm) south and east of this line and is associated lower historic fire frequencies. The snow belt portion "A", has more frequent conifer and beech, while the less snowy portion "B" has more prairie and savanna elements. Although differing in precise boundary location, both USFS and EPA ecoregions support a climatic/floristic break at the next higher rank in their respective hierarchies.

Classification relationships

Among the USFS ecoregional framework (Cleland et al., 2007), most of MLRA 97 is represented by the Humid Temperate Domain (200), Hot Continental Division (220), Midwest Broadleaf Forest Province (222), South Central Great Lakes Section (222J), subsections 222Ja and 222Jb. MLRA 97 was recently extended northward to be more consistent with the limits of the USFS ecoregions subsections 222Ja and 222Jb, because it is more consistent with vegetation patterns and species distributions. A former portion of MLRA 97 that extended westward from the southern end of Lake Michigan (including most of the city of Chicago) was recently removed from the MLRA due to its predominantly non-sandy deposits and reduced lake effect climate, and would have overlapped USFS ecoregion 222K. Among the EPA ecoregional framework (Omernik and Griffith, 2014), most of MLRA 97 falls within Eastern Temperate Forests (Level I: 8), Mixed Wood Plains (Level II: 8.1), Southern Michigan/Northern Indiana Drift Plains (Level III: 56), and Level IV: 56d and 56f. Ecoregion 56f continues north beyond MLRA 97. Former portions of MLRA 97 that encompassed the city of Chicago included Level III ecoregion 54, Central Corn Belt Plains, before the last revision of MRLA boundaries.

Ecological site concept

The central concept of the Backdune is old parabolic dunes that formed during higher lake levels thousands of years ago and have since become stabilized with forest vegetation. The vegetation tends to have a xerophytic species mix of pine and oak species due to higher fire frequency and less lake amelioration of summer high temperatures southwest of the Galien River. "Mesophytic pocket" forests occur in the most sheltered interdune locations.

Associated sites

R097XA001MI	Beach And Foredune
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Similar sites

F097XA002MI	Backdune
F097XB040IN	Chicago Sandy Slopes
R097XA001MI	Beach And Foredune

Table 1. Dominant plant species

Tree	(1) <i>Quercus velutina</i> (2) <i>Tilia americana</i>
Shrub	Not specified
Herbaceous	(1) <i>Hepatica americana</i>

Physiographic features

Old stabilized dunes along a Great Lake.

Table 2. Representative physiographic features

Landforms	(1) Dune
Runoff class	Negligible to medium
Elevation	180 – 230 m
Slope	0 – 100 %
Water table depth	100 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The southern Lake Michigan lake plain has a humid warm continental climate with cold winters and warm summers. Almost two thirds of the precipitation is distributed during the warmer half of the year with a significant portion of the precipitation occurring as heavy downpours during thunderstorms. Thunderstorm activity is enhanced inland by lake breeze fronts, while it is diminished near the lakeshore by the stabilizing effect of the cooler lake waters. Occasionally, thunderstorm microbursts cause localized high winds which open single tree gaps in forest canopies, or more rarely, tornados and derechos (severe straight-line winds) open larger gaps. Fall storms bring more frequent strong winds, but with impacts moderated by the lack of leaves (wind resistance) in the canopy. During July, average precipitation lags potential evapotranspiration, resulting in droughty conditions in the upper soil horizons of upland sites. During dry years, this droughty period is extended into August and September, resulting in dry fuels and potential for wildfire over oak and pine dominated areas.

Winter precipitation light with annual snowfall of 0.7 to 1.0 m (28-40 inches), which is only occasionally enhanced by lake effect during instances of cold north or northeast winds. The combination of lower snowfall, and more limited lake amelioration of warm southwesterly winds, contribute to higher fire frequencies relative to similar sites to the north and east.

The area falls within USDA Hardiness zones (-22 to -24 C) 5b and 6a (slightly colder than areas to the north and east) and has limited lake protection from premature spring warm up prior to the last killing frosts, limiting the potential for fruit crops relative to other portions of MLRA 97.

Table 3 Representative climatic features

Frost-free period (characteristic range)	160-180 days
Freeze-free period (characteristic range)	200-200 days
Precipitation total (characteristic range)	970-990 mm
Frost-free period (actual range)	150-180 days
Freeze-free period (actual range)	200-200 days
Precipitation total (actual range)	970-990 mm
Frost-free period (average)	170 days
Freeze-free period (average)	200 days
Precipitation total (average)	990 mm

- (1) CHICAGO UNIV [USW00014892], Chicago, IL
- (2) INDIANA DUNES NATL LKS [USC00124244], Chesterton, IN

Influencing water features

Not wet, but adjacent to Great Lakes.

Soil features

Soils are excessively drained to moderately well drained sands on >15% slopes. They are commonly classified as Typic Udipsamments, and commonly mapped as Oakville series.

Table 4. Representative soil features

Parent material	(1) Eolian sands
Surface texture	(1) Sand

Drainage class	Somewhat poorly drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	200 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-100.1cm)	3.99 – 10.01 cm
Soil reaction (1:1 water) (0-50cm)	4.5 – 10
Subsurface fragment volume <=3" (0-150.1cm)	Not specified
Subsurface fragment volume >3" (0-150.1cm)	Not specified

Ecological dynamics

Fire was locally important adjacent to other fire prone ecological sites. Low fertility and periodic favors oaks and pine, with mesophytic pocket forests restricted to occasional steep interdunal areas where fire failed to fully penetrate due to discontinuous ground fuels.

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 (%)
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Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 4.1 plant community composition

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

Site Development and Testing Plan Future work is needed, as described in a future project plan, to validate the information presented in this provisional ecological site description. Future work includes field sampling, data collection and analysis by qualified vegetation ecologists and soil scientists. As warranted, annual reviews of the project plan can be conducted by the Ecological Site Technical Team. A final field review, peer review, quality control, and quality assurance reviews of the ESD are necessary to approve a final document.

Other references

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Contributors

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Approval

Nels Barrett, 1/16/2024

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	08/20/2026
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:
