USDA Natural Resources Conservation Service

Ecological site F103XY032MN
Loamy Floodplains

Last updated: 10/04/2023
Accessed: 04/26/2024

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): 103X–Central Iowa and Minnesota Till Prairies

MLRA 103 is in Minnesota (56 percent) and Iowa (44 percent) and consists of approximately 18 million acres. It is in the Western Lake Section of the Central Lowland Province of the Interior Plains in an area known as the "Des Moines Lobe" of the Wisconsin-age ice sheet. The MLRA is mostly on a young, nearly level to gently rolling, glaciated till plain that has moraines and glacial lake plains in some areas. The plain is covered with glacial till, outwash, and glacial lake deposits. Recent alluvium consisting of clay, silt, sand, and gravel fill the bottoms of most of the major river valleys. Paleozoic bedrock sediments, primarily shale and limestone, underlie the glacial deposits in most of the area. The annual precipitation increases from northwest to southeast. Most of the rainfall occurs as high-intensity, convective thunderstorms during the summer. Two-thirds or more of the precipitation falls during the freeze-free period. Snowfall is common in winter. Ground water supplies are adequate for the domestic, livestock, municipal, and industrial needs. Nearly all of this area is farmland, and about four-fifths is cropland.

Classification relationships

Major Land Resource Area (MLRA): Central Iowa and Minnesota Till Prairies (103) (USDA Handbook 296, 2006)

USFS Subregions: North Central Glaciated Plains Section (251B); Upper Minnesota River-Des Moines Lobe (251BA) and Southern Des Moines Lobe (251Be) Subsections (Cleland et al. 2007)

International Vegetation Classification Hierarchy
Class: 1. Forest & Woodland
Subclass: 1.B. Temperate & Boreal Forest & Woodland
Formation: 1.B.3. Temperate Flooded & Swamp Forest
Division: 1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest

The reference community exhibits similarities with Minnesota Department of Natural Resource FFs59 Southern Terrace Forest and FFs68 Southern Floodplain Forest.

Ecological site concept

The Loamy Floodplains ecological site occurs in floodplains along rivers and drainageways throughout MLRA 103. This site is characterized by loamy-textured soils and a hydrologic interaction with the adjacent river or stream. Soils are somewhat poorly drained to moderately well drained. Flooding may be long-term in some areas. Anthropogenic influences such as ditching, draining, and land clearing have altered the historic flooding regime in most watershed. Many areas are now in agricultural production.

Associated sites

F103XY031MN	**Sandy Floodplains** The Sandy Floodplains ecological site is located on sandy-textured Mollisol soils in floodplains and drainageways throughout MLRA 103. Soils drainage class ranges from moderately well drained to excessively drained. Brief flooding may occur on areas within this ecological site.
F103XY033MN	**Wet Floodplains** The Wet Floodplains ecological site occurs in both floodplains and depressions and is extensive throughout MLRA 103. Soils include both Mollisols and Entisols, and soil drainage class is very poorly drained to poorly drained. Areas within this site flood frequently, and some areas may incur very long periods of flooding (over 30 days).
R103XY034MN	**Floodplain Marsh** The Floodplain Marsh ecological site is located on floodplains and depressions. Soils are fine or medium textured and very poorly drained. Flooding on this site ranges from none to frequent with some areas flooding up to 30 days. Ponding is also variable (none to frequent) with areas inundated longer than 30 days. Herbaceous plant communities typically dominate.
R103XY035MN	**Organic Floodplain Marsh** The Organic Floodplain Marsh ecological site is located on floodplains and depressions primarily in the northern portion of MLRA 103. Soils are very poorly drained and derived from organic parent materials. This site both floods and ponds frequently for long periods of time. Herbaceous plant communities usually dominate.
R103XY003MN	**Sandy Upland Prairies** The Sandy Upland Prairie ecological site is located on uplands including outwash plains and valley trains along modern river valleys. Soils are formed from sandy and course loamy outwash and loamy-mantled outwash. Sites do not flood or pond. The reference state vegetation is mesic to dry mesic prairie.
R103XY004MN	**Loamy Upland Prairies** The Loamy Upland Prairies ecological site is located on uplands throughout MLRA 103. Soils are somewhat poorly drained to well drained and are formed from fine loamy till and medium textured lacustrine materials. This site does not flood or pond. The historic vegetative community was fire dependent and included native warm season grassland, brush prairie, and open savanna.
R103XY006MN	**Bedrock Controlled Upland Prairies** The Bedrock Controlled Upland Prairies ecological site is characterized by shallow to moderately deep soils that are influenced by bedrock and have a low available water capacity (1-7 inches).
R103XY011MN	**Footslope/Drainageway Prairies** The Footslope/Drainageway Prairies ecological site is located mainly on footslopes, toeslopes, and upland drainageways. The most common drainage class is moderately well-drained. The site incurs frequent to occasional extremely brief and very brief flooding.
R103XY013MN	**Calcareous Fens** The Calcareous Fens ecological site is characterized by a high water table (i.e. endosaturated) and is usually ponded. Soils are rich in organic matter, very poorly drained, and have high calcium carbonate levels.
R103XY010MN	**Bedrock Controlled Wet Prairies** The Bedrock Controlled Wet Prairies ecological site generally occurs near larger rivers where glacial meltwaters scoured the valley leaving areas of bedrock occurring as strath terraces above the floodplain. Soils are poorly drained and the water table is usually at or near the soil surface in wet spring months. Occasional flooding may occur on some areas within this ecological site.

Similar sites

F103XY031MN	**Sandy Floodplains** The Sandy Floodplains ecological site is located on sandy-textured soils in floodplains and drainageways throughout MLRA 103. Soils drainage class ranges from moderately well drained to excessively drained. Brief flooding may occur on areas within this ecological site.

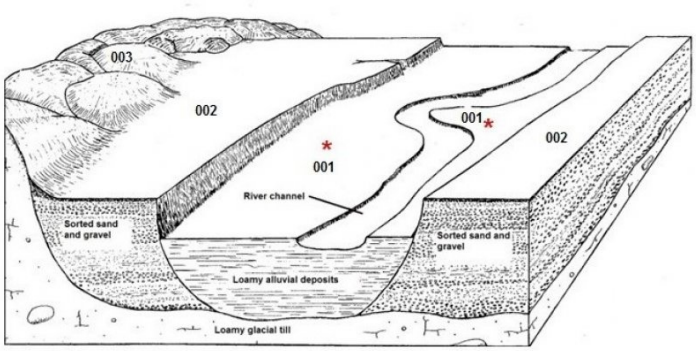
Table 1. Dominant plant species

Tree	(1) *Ulmus americana* (2) *Fraxinus*

Shrub	(1) *Celtis occidentalis*
Herbaceous	(1) *Laportea canadensis*

Physiographic features

The Loamy Floodplains ecological site is on floodplains throughout MRLA 103. Landscape positions include backslopes, summits, shoulders and linear to slightly convex segments on floodplains. This site is influenced by a hydrological relationship with the adjacent river or stream, and the depth of soil saturation will fluctuate based on the river or stream level. Flooding regimes ranging from no flooding to frequent flooding. Some areas within this ecological site may incur long term flooding of 7-30 days.



Code	Ecological Site Name	Representative Soil Series
001	Loamy Floodplain	Spillville, Du Page
002	Sandy Upland Prairie	Estherville, Dickinson
003	Loamy Upland Prairie	Clarion, Nicollet

Figure 1. Block diagrams of the representative Loamy Floodplains and associated ecological sites.

Figure 2. An alluvial setting with multiple different ecological sites. The Loamy Floodplains ecological site is between the road and the open marsh in the upper part of the photograph. (The location and photographer are unknown.)

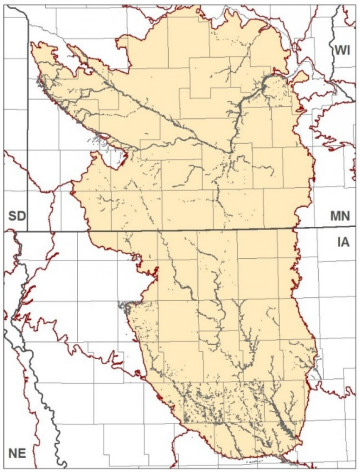


Figure 3. Distribution of the Loamy Floodplains ecological site within MLRA 103. In many cases, the data set is not spatially consistent across political boundaries due to the method by which soils were mapped; e.g. due to county subsets.

Table 2. Representative physiographic features

Hillslope profile	(1) Backslope (2) Summit (3) Shoulder
Landforms	(1) Flood plain
Runoff class	Negligible to medium
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to frequent
Elevation	689–1,837 ft
Slope	0–5%
Water table depth	6–80 in
Aspect	Aspect is not a significant factor

Climatic features

The soil temperature regime of MLRA 103 is classified as “mesic” (i.e., mean annual soil temperature between 46 and 59°F). The average freeze-free period of this ecological site is 156 days, while the average frost-free period is 127 days. The average mean annual precipitation total (average) is 36 inches. Cold air drainage, and the fact that wet soils are generally colder than dry soils, make this site colder than upslope ecological sites. As a result, snow and frost remain longer in the spring resulting in shorter growing seasons than the adjacent uplands.

Table 3. Representative climatic features

Frost-free period (characteristic range)	126-128 days
Freeze-free period (characteristic range)	151-160 days
Precipitation total (characteristic range)	35-37 in
Frost-free period (actual range)	126-128 days
Freeze-free period (actual range)	149-162 days
Precipitation total (actual range)	34-38 in
Frost-free period (average)	127 days
Freeze-free period (average)	156 days
Precipitation total (average)	36 in

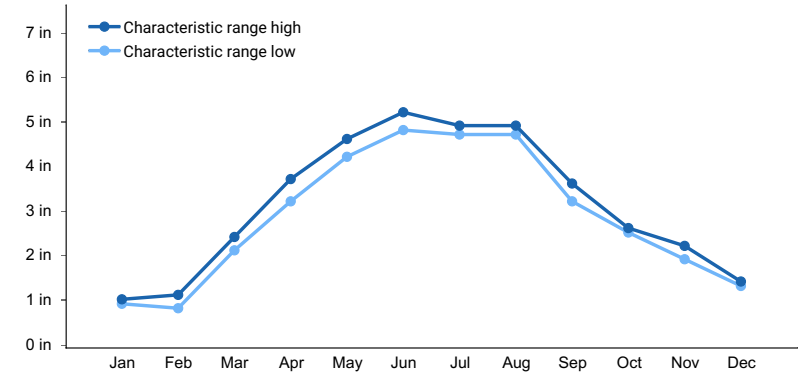


Figure 4. Monthly precipitation range

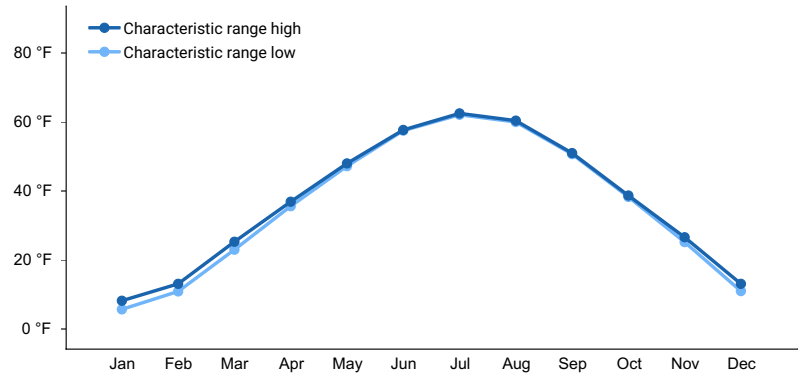


Figure 5. Monthly minimum temperature range

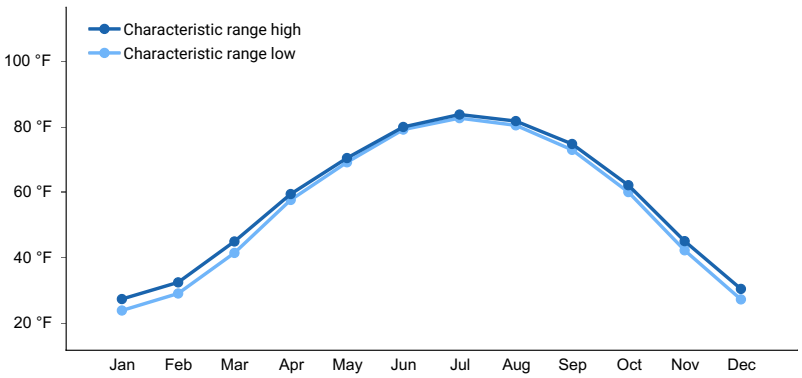


Figure 6. Monthly maximum temperature range

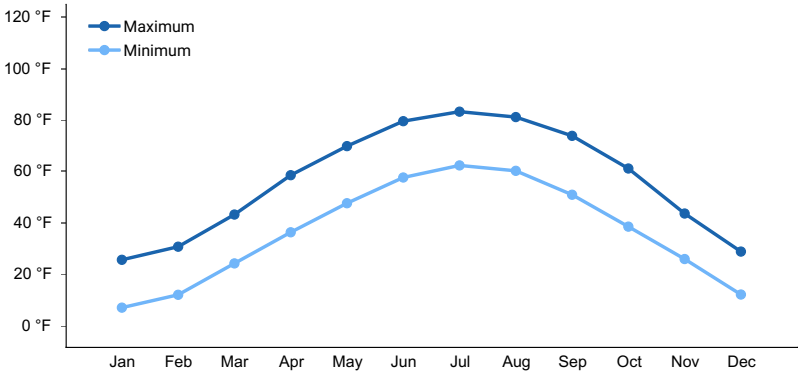


Figure 7. Monthly average minimum and maximum temperature

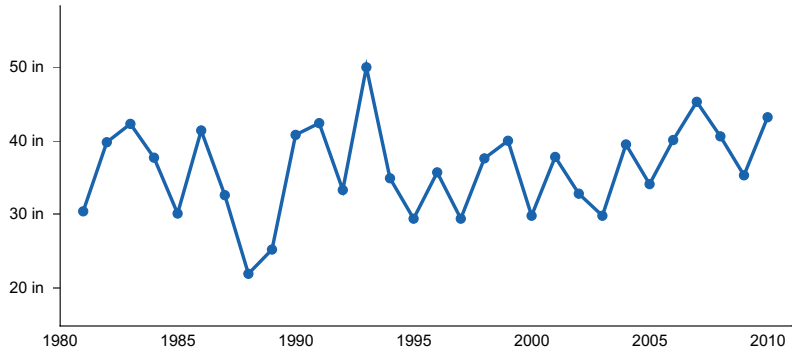


Figure 8. Annual precipitation pattern

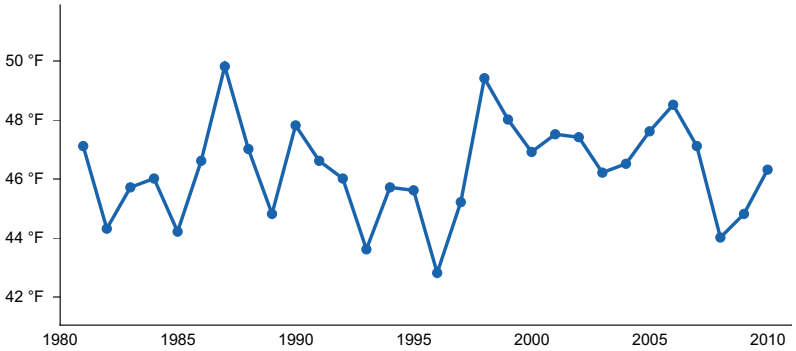


Figure 9. Annual average temperature pattern

Climate stations used

- (1) BOONE [USC00130807], Boone, IA
- (2) OWATONNA [USC00216287], Owatonna, MN

Influencing water features

The Loamy Floodplains ecological site is located on soils that are classified as endosaturated. With natural hydrology intact, the site is influenced by the level of the adjacent river or stream. The water table can be above the soil surface during flood events, but then drop to as low as 6 or more feet during dry periods. Flooding is highly variable and ranges from none to frequent. Flooding duration ranges from very brief to long.

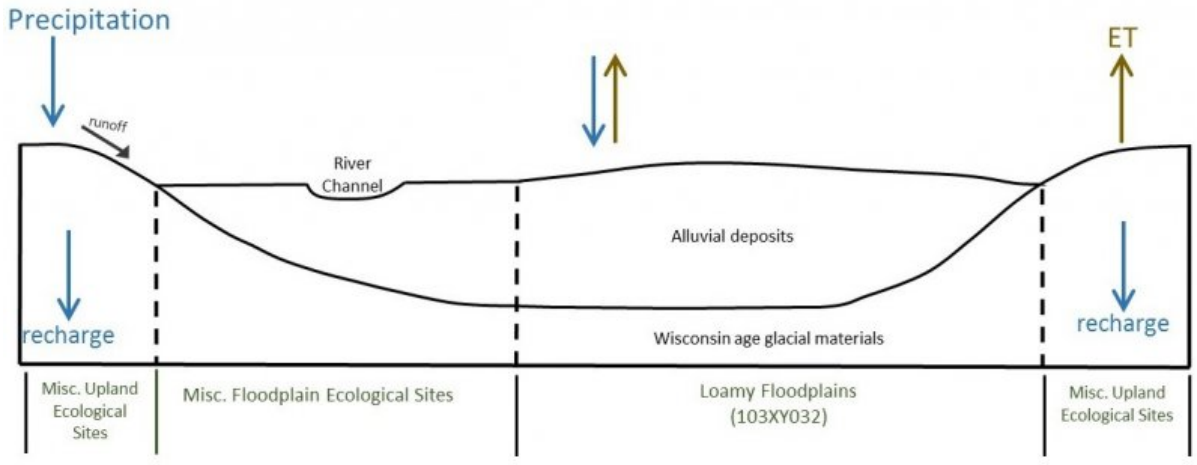


Figure 10. Representation of hydrological factors in a typical area of the Loamy Floodplains and associated ecological sites on the Des Moines Lobe (MLRA 103).

Soil features

The Loamy Floodplains ecological site is located on Ankeny, Bearden, Chaska, Dorchester, Du Page, Hanlon, Klum, La Prairie, Lawler, Lomax, McIntosh, Minneiska, Spillville, Turlin, and Wiota soil series. Soil parent material is alluvium. The surface textures include loam, silt loam, sandy loam, and fine sandy loam. Drainage class ranges from somewhat poorly drained to moderately well drained. There are two basic subdivisions of soil taxonomy - Mollisols and Entisols. The Mollisols have thick mollics (dark layer in the soil profile) due to slope wash and alluvial deposition rather than development under prairie vegetation. The Entisols have a much thinner epipedon. The soils are alluvial materials derived mostly from original Des Moines lobe materials, except in locations where a river or stream crosses the MLRA boundary from an adjacent one.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Silt loam (3) Sandy loam (4) Fine sandy loam
Family particle size	(1) Fine-loamy (2) Coarse-loamy (3) Fine-silty (4) Coarse-silty
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Moderately slow to very rapid
Soil depth	80 in
Available water capacity (0-60in)	6–13 in
Calcium carbonate equivalent (0-40in)	0–40%
Soil reaction (1:1 water) (0-40in)	5.1–8.4
Subsurface fragment volume <=3" (0-40in)	0–30%
Subsurface fragment volume >3" (0-40in)	0–5%

Ecological dynamics

The Loamy Floodplains ecological site has three states: the Reference State, the Disturbed Forest State, and the Tillage State which includes row crop production and seeded grasses.
The Reference State is a riverine deciduous forest with variable co-dominants canopy species and a diverse herbaceous ground layer. This ecological site can be affected by multiple natural triggers (disturbance processes) including flooding, fire, insects, and windstorms. The composition, age, and structure of the plant community will vary and be determined by the flooding regime.

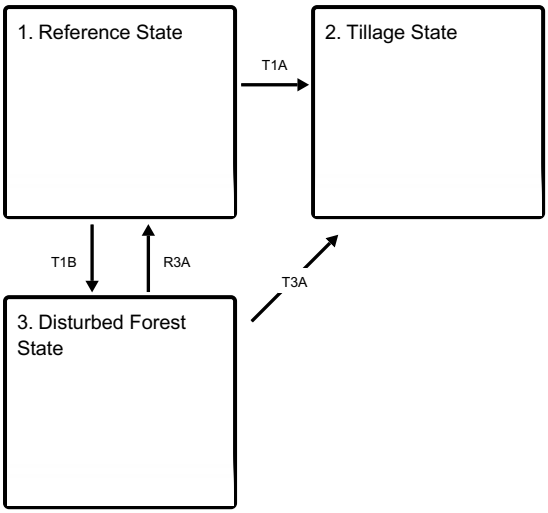
The Tillage State is characterized by tillage and agricultural crop production. The two communities under this state are the Row Crop Community and the Seeded Grassland Community. Management inputs within this state include preparing the site, seeding, fertilizing, controlling weeds and brush, and harvesting.

The Disturbed Forest State is a wooded site that has undergone plant community changes due to human disturbance. Triggers include hydrological modifications, logging/clearing, invasive plants, and unmanaged grazing. Common species include cottonwood, hackberry, maple, ash, and elm. These sites do have some soil, water, and wildlife benefits, but do not have the ecological stability or native plant diversity of a reference state.

The most common trigger on this ecological site is modified hydrology and site clearing transitioning to agricultural. Once a high-quality reference state has been transitioned to a tillage field, the reversibility class is considered irreversible.

State and transition model

Ecosystem states



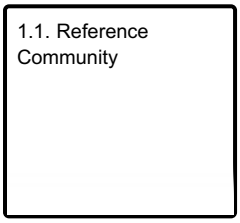
T1A - Site is cleared, tilled, seeded, and managed for crop production

T1B - Site incurs large-scale disturbance and altered plant community

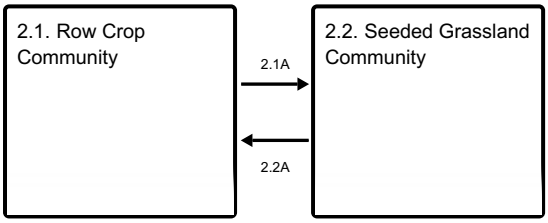
R3A - Restoration of natural hydrology; establishment of desired species; exclusion of anthropogenic disturbances; eradication of invasive species; long-term timber stand management

T3A - Site cleared, soil tillage, crop establishment, and continued agriculture management

State 1 submodel, plant communities



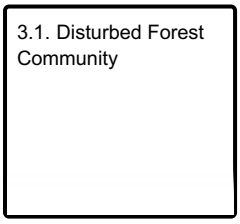
State 2 submodel, plant communities



2.1A - Seeding and management of warm or cool season grasses.

2.2A - Site preparation, soil tillage, crop establishment, weed control

State 3 submodel, plant communities



State 1
Reference State

The Loamy Floodplain reference state is a mature, deciduous, riverine forest composed of multiple co-dominant

canopy species including American elm, green ash, and maple. Early successional communities (young forests recovering from floods or other natural disturbances) will exhibit variable stages of succession. Common species including eastern cottonwood, willows, common hackberry, elm, and ash. Eastern cottonwood may be dominant on some successional sites. The density and composition of the herbaceous groundcover is variable depending on the flooding regime and hydrology. Areas without long-term flooding have a diverse understory community composed of many different herbaceous and grass species. Common species include wood-nettle (*Laportea canadensis*), sedge (Carex spp.), Virginia wildrye (*Elymus virginicus*), beggar-ticks (Bidens spp.), jumpseed (Antenoron virginianum), waterleaf (Hydrophyllum spp.) , clearweed (Pilea spp.), false-nettle (*Boehmeria cylindrica*), and jewelweed (*Impatiens capensis*). Community composition and density, especially shrub cover and herbaceous species composition, will vary depending upon the hydrology and flooding regime.

Resilience management. Resilience management practices include monitoring and treating for invasive vegetation. Successional communities may occur post-flooding if inundation is lengthy.

Dominant plant species

- American elm (*Ulmus americana*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- common hackberry (*Celtis occidentalis*), shrub
- Canadian woodnettle (*Laportea canadensis*), other herbaceous

Community 1.1
Reference Community

The Loamy Floodplain reference community is characterized by a floodplain forest with multiple canopy species and a variable ground cover of native grass and herbaceous species. Mature forest canopy species include American elm, green ash, and maple. Successional communities will vary depending on age, flooding duration, site hydrology, and seed sources but often include willow, eastern cottonwood, common hackberry, ash, elm, American basswood, and maple. Shrub density may be sparse depending on flooding regime, and species will be influenced by the hydrological characteristics of each site. Sites without long-term flooding have a well-developed herbaceous ground layer consisting of many native species.

Resilience management. Resilience management practices include monitoring for invasive vegetation, applying weed control methods as needed, and excluding other anthropogenic disturbances.

Dominant plant species

- American elm (*Ulmus americana*), tree
- green ash (*Fraxinus pennsylvanica*), tree
- common hackberry (*Celtis occidentalis*), shrub
- Canadian woodnettle (*Laportea canadensis*), other herbaceous

State 2
Tillage State

The Tillage State contains the Row Crop Community and the Seeded Grassland Community. This state describes areas within the Loamy Floodplain ecological site that are currently in crop production or areas that were previously tilled but now are seeded to grass. Pathway mechanisms include preparing the site, planting desired species, applying herbicide, applying fertilizer, and harvesting. Depending on the flooding regime, some areas of this ecological site may not be feasible for agricultural uses. Hydrological modifications (tiling and ditching) may be installed to improve drainage on tilled areas. Soil tillage is the primary trigger to State 2. Tillage alters dynamic soil properties, including bulk density, structure, organic carbon content, and saturated hydraulic conductivity. Intensive tillage negatively impacts soil ecological functions. Conservation practices help mediate soil health impacts. Conservation tillage minimizes soil disturbance and improves soil structure and soil health. A cover crop rotation builds soil structure, improves infiltration rates, reduces runoff and erosion, and protects water quality. A few areas within this ecological site may have been converted to a warm-season or cool-season grass production. Seed mix selection will depend on landowner goals and objectives. Seeded grasslands are not as species rich or biologically diverse as native habitats; however, they still offer ecological benefits for wildlife, especially grassland birds, water quality protection, and soil health.

Dominant plant species

- corn (*Zea mays*), grass
- soybean (*Glycine max*), other herbaceous

Community 2.1
Row Crop Community

Community 2.1 consists of intensive row crop agriculture. Soil tillage and intentional plant establishment are the primary triggers. The most common crops are corn and soybeans on an annual rotation. Many crops, however, are feasible for these areas. A secondary trigger is drainage modifications (ditching and tiling), which may be installed to improve soil drainage. Conservation tillage practices may be implemented to reduce soil erosion while still maintaining a crop rotation. These practices protect the soil surface from erosion and allow water to infiltrate instead of running off. Examples include no-till or ridge-till, which leave residue on the surface of the field. Additional soil health benefits can be gained by adding alternative crops to fields that are already in conservation tillage. By diversifying the crop rotation, landowners take additional management steps to improve soil health and protect water quality. A variety of crops may be grown on these sites depending on the landowners goals and objectives.

Resilience management. Resilience management practices include preparing the sites, planting, fertilizing, controlling weeds, and harvesting. The maintenance of the desired vegetation community is controlled by the intensity, frequency, duration, and timing of agricultural practices.

Dominant plant species

- corn (*Zea mays*), grass
- soybean (*Glycine max*), other herbaceous

Community 2.2
Seeded Grassland Community

The Seeded Grassland Community grows in areas that were previously tilled and used for agricultural production but have been transitioned to either warm-season or cool-season grasses. The primary trigger is the intentional establishment of a grass species. Warm-season grasses are commonly planted through conservation programs, such as the NRCS Conservation Reserve Program (CRP). Seed mix selection depends on site-specific characteristics. Also feasible are cool-season grass species such as Kentucky bluegrass and reed canarygrass. Many cool-season grasses can be planted, depending on landowner goals. Management inputs include seeding, fertilizing, and controlling weeds and brush. Resilience management practices include invasive plant management and a program of planned grazing. Many of these areas are eventually transitioned to annual crop production.

Resilience management. The resilience management practices may include planting desired species, managing grazing, mowing, fertilizing, and controlling unpalatable plant species.

Dominant plant species

- big bluestem (*Andropogon gerardii*), grass
- Indiangrass (*Sorghastrum nutans*), grass

Pathway 2.1A
Community 2.1 to 2.2

This pathway converts Community 2.1 (row crops) to Community 2.2 (seeded grassland). The primary mechanism of change is the seeding of desired grass species. Seed mixes commonly include a variety of forbs. This pathway may be triggered in conjunction with a conservation program such as the NRCS Conservation Reserve Program (CRP). The site is removed from crop production and seeded with warm-season grasses which benefit wildlife, soil health, and water quality. Multiple resilience management practices may be utilized after warm-season grass establishment. Examples include prescribed fire, brush management, and herbaceous weed treatment. Cool-season grasses are feasible. Species planted depends on site characteristics. A small percentage of MLRA 103 currently supports cool-season grasses. Resilience management practices for cool-season grass sites include planned grazing, invasive plant management, and harvest management (hay production).

Conservation practices

Forage and Biomass Planting

Pathway 2.2A
Community 2.2 to 2.1

This pathway describes the site transitioning from a seeded grassland to row crop agriculture. The mechanisms of change are tillage and intentional plant establishment (crop seeding). Resilience management practices include weed control (herbicide application), disturbance management (field cultivating), and harvest management.

State 3
Disturbed Forest State

This state describes a forest site that has incurred significant anthropogenic disturbances which have altered the species composition and physiognomy of the canopy and understory. Site disturbance may include altered hydrology, selective harvest (tree removal), site clearing, and invasive species invasion. Numerous ruderal woodland and forest plant communities may occur on this ecological site depending on the type and severity of disturbance, the successional stage of the plant community, available seed sources, ongoing disturbances, and any restoration management activities. Numerous invasive non-native species often dominate the shrub and understory layers.

Dominant plant species

- eastern cottonwood (*Populus deltoides*), tree
- boxelder (*Acer negundo*), tree
- ash (*Fraxinus*), tree
- elm (*Ulmus*), tree
- willow (*Salix*), shrub
- reed canarygrass (*Phalaris arundinacea*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous

Community 3.1
Disturbed Forest Community

Community 3.1 is an altered forest community caused by previous or ongoing human disturbances. Invasive species are common in this community. Canopy composition varies depending on the severity and type of disturbances, community age, and the availability of seed sources. Invasive, non-native species are common on these sites and will continue to increase without management intervention.

Dominant plant species

- eastern cottonwood (*Populus deltoides*), tree
- boxelder (*Acer negundo*), tree
- ash (*Fraxinus*), tree
- elm (*Ulmus*), tree
- willow (*Salix*), shrub
- reed canarygrass (*Phalaris arundinacea*), grass
- garlic mustard (*Alliaria petiolata*), other herbaceous

Transition T1A
State 1 to 2

Transition T1A is the conversion of the Reference State to agriculture. The triggers are site clearing, soil tillage. and intentional plant establishment (crop seeding). Resilience management practices include common agricultural practices such as seeding, fertilizing, and managing invasive plants with herbicides or field cultivation. Hydrological modifications, such as ditching and tiling, may be present.

Constraints to recovery. Site clearing and soil tillage preclude recovery of the former state.

Transition T1B
State 1 to 3

Transition T1B is a transition from a mature deciduous forest to a disturbed (ruderal) forest. Triggers include timber harvest, surface site disturbance, grazing, and introduction of non-native species. Numerous species may be on site depending on hydrology, disturbance regime, and seed sources. The native plant community is altered, and these areas do not exhibit the ecological function or vegetative composition of State 1.

Restoration pathway R3A
State 3 to 1

Restoration to the Reference State may be feasible for some sites with long-term management inputs including restoration of natural hydrology, establishment of desired species, forest stand management (selective thinning), and control of invasive species. Triggers include intentional plant establishment (planting desired species), absence of disturbance (site protected from grazing and other site altering disturbances), timber stand improvement activities, and the monitoring/eradication of invasive plant species.

Conservation practices

Brush Management
Tree/Shrub Site Preparation
Tree/Shrub Establishment
Forest Stand Improvement

Transition T3A
State 3 to 2

Transition T3A is the transition of a disturbed forest state to agriculture production. This is a common pathway in MLRA 103. The mechanisms of change include clearing, site preparation, tillage, and intentional plant establishment (crop seeding). Continued resilience management practices are necessary and include weed control (herbicide application), disturbance management (field cultivating), and harvest management.

Constraints to recovery. Soils tillage and the transition to agriculture preclude recovery of the former state.

Additional community tables

Other references

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.

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Approval

Suzanne Mayne-Kinney, 10/04/2023

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	04/26/2024
Approved by	Suzanne Mayne-Kinney
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):**

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

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

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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:**
