

## *Ecological Site Description*

### **Claypan Summit Prairie**

**R112XY011MO**

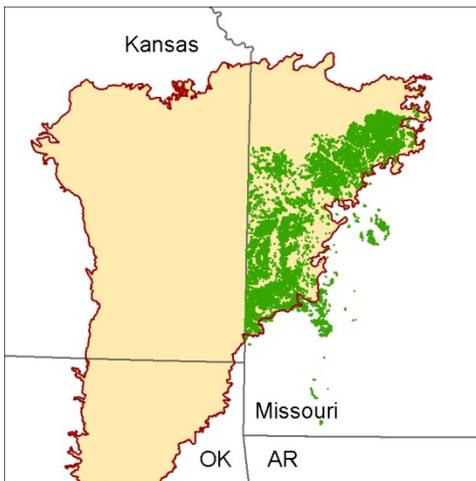
- (/Amorpha canescens - Rosa carolina/Schizachyrium scoparium - Andropogon gerardii)
- (/lead plant – Carolina rose/little bluestem – big bluestem)

An Ecological Site Description (ESD) is a reference document of ecological knowledge regarding a particular land area (ecological site). An ESD describes ecological potential and ecosystem dynamics of land areas and their potential management. Ecological sites are linked to soil survey map unit components, which allows for mapping of ecological sites. *(NOTE: This is a “provisional” ESD, and is subject to change. It contains basic ecological information sufficient for conservation planning and land management in Missouri. After additional information is developed and reviewed, a “Correlated” ESD will be published and will be available via the Web Soil Survey <http://websoilsurvey.nrcs.usda.gov>.)*

**Major Land Resource Area:** 112 – Cherokee Prairies

#### **Introduction**

The Cherokee Prairies (area outlined in red on the map) is a nearly level to rolling, weakly dissected plain. Elevation ranges from about 330 feet along the Verdigris River in the south to over 1,300 feet



along the northwest border with the Flint Hills. Local relief is three to ten feet, with major valley floodplains typically less than eight feet below the adjacent uplands. The northern and eastern part of the area is primarily in the Osage River watershed, and the southern part is mainly in the Neosho and Verdigris River watersheds. Loess blankets the northern part of the area but thins to the south. Nearly all of the upland plain is underlain with Pennsylvanian aged sandstones and shales, and most upland soils are formed in residuum from these materials.

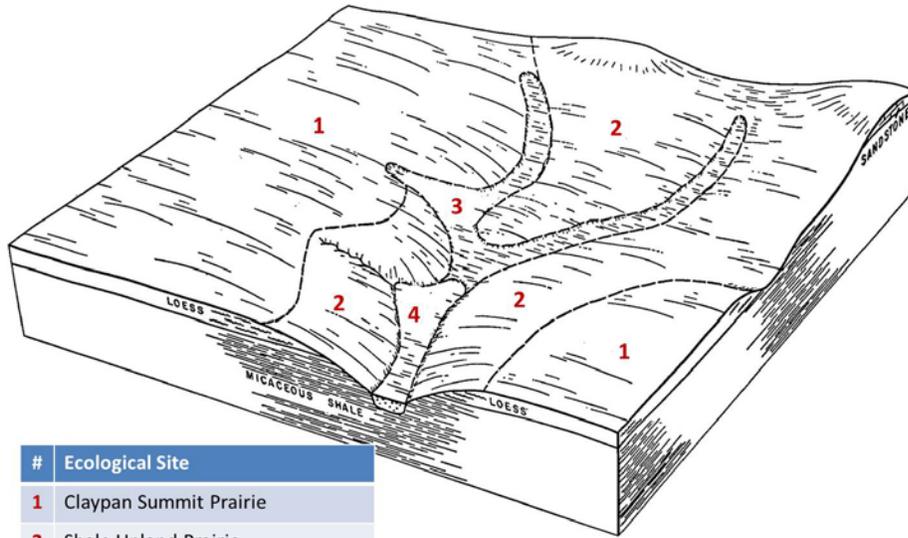
Claypan Summit Prairies are within the green areas on the map (Missouri portion only; relationships to Kansas and Oklahoma Ecological Sites are currently under review).

These sites are widely distributed on broad interfluvial summits in the central and southern part of the area. Sandstone/Shale ecological sites are commonly downslope. Soils have a clay subsoil that perches water in the spring and affects rooting depth and species composition.

#### **Physiographic Features**

This site is on broad upland summit interfluvial divides, with slopes of less than 3 percent. The site generates runoff to adjacent, downslope ecological sites. This site does not flood.

The following figure (adapted from Hughes, 1974) shows the typical landscape position of this ecological site, and landscape relationships with other ecological sites. It is within the area labeled “1” on the figure. A variety of ecological sites may occur downslope, such as the Shale Upland Prairie shown here.



#	Ecological Site
1	Claypan Summit Prairie
2	Shale Upland Prairie
3	Wet Upland Drainageway Prairie
4	Loamy Floodplain Prairie

**Soil Features**

These soils have an abrupt textural change to silty clay or clay at about 10 to 15 inches. Abrupt textural changes impede but do not exclude rooting. The soils were formed under prairie vegetation, and have dark, organic-rich surface horizons. They have silt loam surface horizons, and silty clay to clay subsoils. Parent material is loess underlain by residuum from shale. A seasonal

high water table is perched above the clayey subsoil during the spring months in most years. Soil series associated with this site include Hartwell, Medoc, Opolis, and Parsons.

**Ecological Dynamics**

*Information contained in this section was developed using historical data, professional experience, field reviews, and scientific studies. The information presented is representative of very complex vegetation communities. Key indicator plants, animals and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.*

Claypan Summit Prairies were dominated by tallgrass prairie grasses and forbs, but also had a substantial component of wet tolerant sedges. This expanse of grass stretched for miles and was only interrupted by shallow drainages whose wetness lessened the influence frequent, intense fires. Here the prairie transitioned into shrubby thickets and savannas with scattered trees.

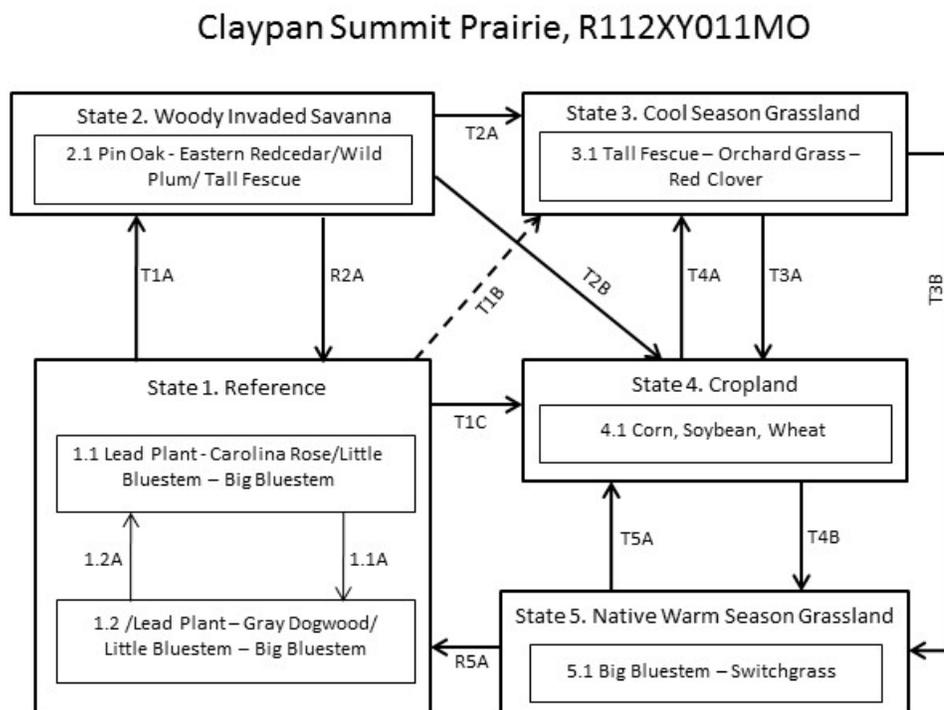
Leadplant and New Jersey tea were typical low growing shrubs that occurred over the site. Unlike most shrubs, these plants are both quite tolerant to fire. Islands of other shrubs such as dogwood, reedroot, coral berry and prairie rose were also found on the site.

With little to interrupt fire, this ecological site burned every 1 to 3 years. Fire removed dead plant litter and provided room for a lush growth of prairie vegetation. Fire also kept woody species at bay. Grazing by native large herbivores also impacted these sites. Their activities would have altered composition and structure of the vegetation. Fuel loads would have been altered by heavy grazing and fire behavior affected, providing for a diversity of structure and composition. The partially wooded draws would have burned less intensely and frequently. During fire free intervals woody species would have increased in abundance and spread out onto the prairie.

Today, Claypan Summit Prairies are nearly extirpated from the region as the former prairies have been converted to intensive agriculture. Few known remnants exist and most are degraded by fire suppression and grazing by domestic livestock.

A State and Transition Diagram is depicted in Figure 1. Detailed descriptions of each state, transition, plant community, and pathway follow the model. This model is based on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

**Figure 1: State and transition diagram**



Code	Event/Activity/Process
T1A	Fire suppression >20 years; woody invasion
T1B	Tillage; vegetative seeding; grassland management
T1C, T3A, T5A	Tillage; conservation cropping system; surface drainage
T2A	Woody removal; tillage; vegetative seeding; grassland management
T2B	Woody removal; tillage; conservation cropping system
T4A	Vegetative seeding; grassland management
T3B, T4B	Vegetative seeding; prescribed fire; grassland management
1.1A	Fire-free interval 10+ years
1.2A	Fire interval 1-3 years
R2A	Woody removal; prescribed fire 1-3 years
R5A	Vegetative seeding; prescribed fire 1-3 years

**Ecological States**

**State 1: Reference**

This State is native tall grass prairie dominated by little bluestem, switchgrass and forbs, but also a substantial component of wet tolerant sedges. This State occurs on level to gently sloping soils that have a seasonal high water table that is perched above the abrupt textural change or clayey subsoil during the spring months in most years. This condition influences the species composition and site productivity. Two phases can occur that will transition back and forth depending on fire frequencies. Longer fire free intervals will allow woody species to increase such as gray dogwood and eastern redcedar. When fire intervals shorten these woody species will decrease. This State is extremely rare. Nearly all sites have been converted to cool season grasslands and cropland.

**State 2: Woody Invaded Savanna**

Degraded Reference States that have experienced fire suppression for 20 or more years will transition to this State. With fire suppression, woody species such as pin oak and eastern redcedar will begin to dominate transitioning this state from a prairie to a Woody Invaded Savanna. Native ground cover will also decrease and invasive species such as tall fescue may begin to dominate. Transition to cool season grasslands (State 3) or intensive cropland (State 4) is very common.

**State 3: Cool Season Grassland**

Conversion of other states to non-native cool season species such as tall fescue and red clover has been common in this area. Occasionally, these pastures will have scattered pin oaks. Long term uncontrolled grazing can cause significant soil erosion and compaction. A return to the Reference State may be impossible, requiring a very long term series of management options.

**State 4: Cropland**

This is the dominant State that exists currently with intensive cropping of corn, soybeans, and wheat occurring. Some conversion to cool season grassland occurs for a limited period of time before transitioning back to cropland. Limited acres are sometimes converted to native warm season grassland.

**State 5: Native Warm Season Grassland**

Conversion from the Cool Season Grassland (State 3) or the Cropland (State 4) to this State is increasing due to renewed interest in warm season grasses as a supplement to cool season grazing systems or as a native restoration activity. This State is the most easily transformable state back to a Reference State. Substantial restoration time and management inputs will be needed.

**Reference State Plant Community**

Shrubs

Common Name	Botanical Name	Cover % (low-high)	Canopy Height (ft)
CAROLINA ROSE	<i>Rosa carolina</i>	5-10	2
NEW JERSEY TEA	<i>Ceanothus americanus</i>	5-10	4
LEAD PLANT	<i>Amorpha canescens</i>	5-10	3
GRAY DOGWOOD	<i>Cornus racemosa</i>	5-10	6
CORAL BERRY	<i>Symphoricarpos orbiculatus</i>	5-10	3

Forbs

Common Name	Botanical Name	Cover % (low-high)
WILD QUININE	<i>Parthenium integrifolium</i>	5-20
BUTTERFLY WEED	<i>Asclepias tuberosa</i>	5-20
BLAZING STAR	<i>Liatris pycnostachya</i>	5-20
GOLDENROD	<i>Solidago missouriensis</i>	5-20
ASHY SUNFLOWER	<i>Helianthus mollis</i>	5-20
RATTLESNAKE MASTER	<i>Eryngium yuccifolium</i>	5-20
CREAM WHITE INDIGO	<i>Baptisia bracteata</i>	5-20
WHITE WILD INDIGO	<i>Baptisia alba</i>	5-20
PRAIRIE MILKWEED	<i>Asclepias sullivantii</i>	5-20
FIELD MILKWORT	<i>Polygala sanguinea</i>	5-10
ROSINWEED	<i>Silphium integrifolium</i>	5-20
ILLINOIS BUNDLE FLOWER	<i>Desmanthus illinoensis</i>	5-10

## Grasses and sedges

Common Name	Botanical Name	Cover % (low-high)
LITTLE BLUESTEM	<i>Schizachyrium scoparium</i>	30-50
MEAD'S SEDGE	<i>Carex meadii</i>	5-10
BUSH SEDGE	<i>Carex bushii</i>	5-10
SPIKE RUSH	<i>Eleocharis tenuis</i>	5-10
SIDEOATS GRAMA	<i>Bouteloua curtipendula</i>	10-20
BIG BLUESTEM	<i>Andropogon gerardii</i>	30-50
INDIAN GRASS	<i>Sorghastrum nutans</i>	10-20
SWITCHGRASS	<i>Panicum virgatum</i>	5-10
EASTERN GAMAGRASS	<i>Tripsacum dactyloides</i>	5-10

## Site Interpretations

## Wildlife\*

- Game species that utilize this ecological site include:  
Northern Bobwhite will utilize this ecological site for food (seeds, insects) and cover needs (escape, nesting and roosting cover).

Cottontail rabbits will utilize this ecological site for food (seeds, soft mast) and cover needs.

Turkey will utilize this ecological site for food (seeds, green browse, soft mast, and insects) and nesting and brood-rearing cover. Turkey poults feed heavily on insects provided by this site type.

White-tailed deer will utilize this ecological site for browse (plant leaves in the growing season, seeds and soft mast in the fall/winter). This site type also can provide escape cover.

- Bird species associated with this ecological site's reference state condition:  
Breeding birds as related to vegetation structure (related to time since fire, grazing, haying, and mowing):

Vegetation Height Short (< 0.5 meter, low litter levels, bare ground visible):

Grasshopper Sparrow, Horned Lark, Upland Sandpiper, Greater Prairie Chicken, Northern Bobwhite

Vegetation Height Moderate (0.5 – 1 meter, moderate litter levels, some bare ground visible): Eastern Meadowlark, Dickcissel, Field Sparrow, Upland Sandpiper, Greater Prairie Chicken, Northern Bobwhite, Blue Grosbeak, Scissor-Tailed Flycatcher, Eastern Kingbird, Lark Sparrow

Vegetation Height Tall (> 1 meter, moderate-high litter levels, little bare ground visible): Henslow's Sparrow, Dickcissel, Greater Prairie Chicken, Field Sparrow, Northern Bobwhite, Sedge Wren, Northern Harrier

Brushy – Mix of grasses, forbs, native shrubs (e.g., *Rhus copallina*, *Prunus americana*), native vines (*Rubus* spp., *Rosa carolina*) and small trees (e.g., *Cornus racemosa*): Bell's Vireo, Yellow-Breasted Chat, Loggerhead Shrike, Brown Thrasher, Common Yellowthroat

Winter Resident: Short-Eared Owl, Northern Harrier

- Amphibian and reptile species associated with this ecological site's reference state condition: prairies with crawfish burrows may have Northern Crawfish Frog (*Rana areolata circumlosa*); Ornate Box Turtle (*Terrapene ornata ornata*), Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*), Prairie Ring-necked Snake (*Diadophis punctatus arnyi*), Prairie Kingsnake (*Lampropeltis calligaster calligaster*), and Bullsnake (*Pituophis catenifer sayi*).

Prairies with ephemeral vernal fishless wetlands: Western Chorus Frog (*Pseudacris triseriata triseriata*), Plains Leopard Frog (*Rana blairi*), Eastern Tiger Salamander (*Ambystoma tigrinum*), and Great Plains Narrow-mouthed Toad (*Gastrophryne olivacea*).

- Small mammals associated with this ecological site's reference state condition: Least Shrew (*Cryptotis parva*), Plains Pocket Gopher (*Geomys bursarius*), Prairie Vole (*Microtus ochrogaster*), Meadow Jumping Mouse (*Zapus hudsonius*), and Badger (*Taxidea taxus*).
- Many native insect species are likely associated with this ecological site, especially native bees, ants, beetles, butterflies and moths, and crickets, grasshoppers and katydids. However information on these groups is often lacking enough resolution to assign them to individual ecological sites.

Insect species known to be associated with this ecological site's reference state condition: Regal Fritillary butterfly (*Speyeria idalia*) whose larvae feed primarily on native prairie violets (*Viola pedata*, *V. pedatifida*, and *V. sagittata*); Mottled Dusky Wing butterfly (*Erynnis martialis*), Ottoo Skipper butterfly (*Hesperia ottoe*), Arogos Skipper butterfly (*Atrytone arogos iowa*), Golden Byssus butterfly (*Problema byssus kumskaka*), Delaware Skipper butterfly (*Atrytone logan logan*), and Crossline Skipper butterfly (*Polites origenes*). The larvae of the moth *Eucosma bipunctella* bore into compass plant (*Silphium laciniatum*) roots and feed and the larvae of the moth *Eucosma giganteana* bore into a number of *Silphium* species roots and feed. Native bees, important pollinators, that may be associated with this ecological site's reference condition include: *Colletes brevicornis*, *Andrena*

*beameri*, *A. helianthiformis*, *Protandrena rudbeckiae*, *Halictus parallelus*, *Lasioglossum albipennis*, *L. coreopsis*, *L. disparilis*, *L. nymphaereum*, *Ashmeadiella buconis*, *Megachile addenda*, *Anthidium psoraleae*, *Eucera hamata*, *Melissodes coloradensis*, *M. coreopsis*, and *M. vernoniae*. The Short-winged Katydid (*Amblycorypha parvipennis*), Prairie Mole Cricket (*Gryllotalpa major*), Green Grasshopper (*Hesperotettix speciosus*) and Two-voiced Conehead katydid (*Neoconcephalus bivocatus*) are possible orthopteran associates of this ecological site.

Other invertebrate associates include the Grassland Crayfish (*Procambarus gracilis*).

\*This section prepared by Mike Leahy, Natural Areas Coordinator, Missouri Department of Conservation, 2013

### Forestry

- Management: **This ecological site is not recommended for traditional timber management activity.** Historically this site was dominated by a ground cover of native prairie grasses and forbs. Some scattered open grown trees may have also been present. May be suitable for non-traditional forestry uses such as windbreaks, environmental plantings, alley cropping (a method of planting, in which rows of trees or shrubs are interspersed with rows of crops) or woody bio-fuels.

### Glossary

*Backslope* – a hillslope profile position that forms the steepest and generally linear, middle portion of the slope.

*Backswamp* – marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces

*Calcareous* – the presence of calcium carbonate in the soil parent material within the rooting zone; relatively alkaline

*Claypan* – a dense, compact, slowly permeable layer in the subsoil having much higher clay content than the overlying material

*Chert* – hard, extremely dense or compact crystalline sedimentary rock, consisting dominantly of interlocking crystals of quartz

*Cliff* – a significant vertical, or near vertical, rock exposure

*Dolomite* – a type of sedimentary rock that is a carbonate mineral composed of calcium magnesium carbonate

*Drainageway* – the upper most reach of a stream channel system characterized by little meandering

*Dry* – a site where soil moisture is limiting during the growing season; low available water capacity

*Dune* – a low mound, ridge, bank or hill of loose, wind-blown sand

*Exposed* – steep, south and west-facing slopes, which are warmer and drier than other slope aspects

*Flatwoods* – a type of woodland that occurs on soils with a root restricting subsoil layer within 20 to 30 inches, resulting in very slow runoff and ponding that remains saturated for most of the winter and early spring months but dries out and becomes very dry in the summer months; plants that grow there must be adapted to both conditions

*Floodplain* – the nearly level plain that borders a stream and is subject to inundation under flood-stage conditions

*Footslope* – a hillslope position at the base of a slope where hillslope sediment (colluvium) accumulates

*Forest* – a vegetative community dominated by trees forming a closed canopy and interspersed with shade-tolerant understory species

*Fragipan* – a dense, brittle subsoil horizon that is extremely hard and compact when dry

*Glade* – open, rocky, barren vegetative community dominated by drought-adapted forbs and grasses, typically with scattered, stunted woody plants

*Igneous* – bedrock formed by cooling and solidification of magma. Granite and rhyolite are typical igneous bedrocks in Missouri

*Limestone* – a type of sedimentary rock composed largely of calcium carbonate

*Loess* – material transported and deposited by wind and consisting predominantly of silt-size particles

*Loamy* – soil material containing a relatively equal mixture of sand and silt and a somewhat smaller proportion of clay

*Marsh* – a type of wetland that is dominated by herbaceous rather than woody plant species

*Moist* – a site that is moderately well to well drained and has high available water capacity, resulting in a well-balanced supply of moisture (neither too dry nor too wet).

*Mudstone* – blocky or massive, fine-grained sedimentary rock in which the proportions of clay and silt are approximately equal

*Natric* – a soil horizon that displays a blocky, columnar, or prismatic structure and has a subhorizon with an exchangeable-sodium saturation of over 15%

*Outwash* – stratified sediments of sand and gravel removed or “washed out” from a glacier by melt-water streams

*Prairie* – a vegetative community dominated by perennial grasses and forbs with scattered shrubs and very few trees

*Protected* – steep, north- and east-facing slopes, which are cooler and moister than other slope aspects

*Residuum* - unconsolidated, weathered, or partly weathered mineral material that accumulates by disintegration of bedrock in place

*Riser* – a component of terraces and flood-plain steps consisting of the steep side slope; the escarpment

*Riverfront* – a vegetative community in the floodplain immediately adjacent and generally parallel to a river or stream channel

*River hills* – a geographic area characterized by thick, dissected loess deposits, formed immediately adjacent to the edges of the Missouri and Mississippi River floodplains

*Sandy* – a coarse-sized soil containing a large mixture of sand and gravels and a somewhat smaller proportion of silts and clays with excessive drainage

*Sandstone* – a sedimentary rock containing dominantly sand-size particles

*Savanna* – grasslands interspersed with open-grown scattered trees, groupings of trees, and shrubs

*Shale* – a sedimentary rock formed from clay, silty clay, or silty clay loam deposits and having the tendency to split into thin layers

*Shallow* – a site with bedrock within 20 inches of the surface

*Shoulder* – the slope profile position that forms the convex surface near the top of a hill slope; it comprises the transition zone from summit to backslope

*Sinkhole* – a closed, circular or elliptical depression, commonly funnel-shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock or by collapse of underlying caves within bedrock

*Summit* – the top or highest area of a hillslope

*Swale* – shallow, closed depressions irregularly spaced across a floodplain or terrace with an irregularly undulating surface.

*Swamp* – an area of low, saturated ground, intermittently or permanently covered with water, and predominantly vegetated by shrubs and trees.

*Talus* – rock fragments of any size or shape (usually coarse and angular) derived from and lying at the base of a cliff or very steep rock slope.

*Terrace* – a step-like surface, bordering a valley floor that represents the former position of a flood plain

*Till* – dominantly unsorted and unstratified soil material deposited directly by a glacier

*Upland* – a general term for the higher ground of a region, in contrast with a low-lying, adjacent land such as a valley or floodplain

*Wet* – a somewhat poorly, poorly or very poorly drained site that has an oversupply of moisture during the growing season

*Woodland* – a highly variable vegetative community with a canopy of trees ranging from 30 to 100 percent closure with a sparse midstory and a dense ground flora of grasses, sedges and forbs

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