

Ecological site R036XB008NM Meadow

Last updated: 1/16/2025
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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): 036X–Southwestern Plateaus, Mesas, and Foothills

R036XB008NM – Meadow is an ecological site that on stream terrace, valley floors and alluvial flats positions in MLRA 36 (Southwestern Plateaus Mesas and Foothills). The southern portion MLRA 36 is illustrated yellow color on the map where this site occurs. The site concept was established in the Southwestern Plateaus, Mesas, and Foothills – Warm Semiarid Mesas and Plateaus LRU (Land Resource Area). This LRU has 10 to 16 inches of precipitation and has a mesic temperature regime. Lower part of MLRA 36 is dominated by summer precipitation for monsoons, unlike the upper part of MLRA 36 which is almost an equal split.

Classification relationships

NRCS & BLM: Major Land Resource Area 36, Southwestern Plateaus Mesas and Foothills (United States Department of Agriculture, Natural Resources Conservation Service, 2006). USFS: 313Bd Chaco Basin High Desert Shrubland and 313Be San Juan Basin North subsections 313B Navaho Canyonlands Section 313 Colorado Plateau Semi-Desert (Cleland, et al., 2007). 315Ha Central Rio Grande Intermontane, and 315Hb North Central Rio Grande Intermontane subsections 315H Central Rio Grande Intermontane Section 315 Southwest Plateau and Plains Dry Steppe and Shrub (Cleland, et al., 2007). 315Ad Chupadera High Plains Grassland subsections 315A Pecos Valley Section 315 Southwest Plateau and Plains Dry Steppe and Shrub (Cleland, et al., 2007). 331Jb San Luis Hills and 331Jd Southern San Luis Grasslands subsections 331J Northern Rio Grande Basin Section 331 Great Plains- Palouse Dry Steppe (Cleland, et al., 2007). M313Bd Manzano Mountains Woodland subsection Sacramento-Monzano Mountains Section M313 Arizona-New Mexico Mountains Semi-Desert - Open Woodland - Coniferous Forest - Alpine Meadow M331Fg Sangre de Cristo Mountains Woodland and M331Fh Sangre de Cristo Mountains Coniferous Forest subsection M331F Southern Parks and Rocky Mountain Range Section M331 Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow M331Gk Brazos Uplift and M331Gm Jemez and San Pedro Mountains Coniferous Forest subsections M331G South Central Highlands Section M331 Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow EPA: 21d Foothill Shrublands and 21f Sedimentary Mid-Elevation Forests 21 Southern Rockies 6.2 Western Cordillera 6 Northwestern Forested Mountains (Griffith, 2006). 20c Semiarid Benchlands and Canyonlands 20 Colorado Plateaus 10.1 Cold Deserts 10 North American Deserts (Griffith, 2006). 22m Albuquerque Basin, 22i San Juan/Chaco Tablelands and Mesas, 22h North Central New Mexico Valleys and Mesas, 22f Taos Plateau, and 22g Rio Grande Floodplain, 22 Arizona/New Mexico Plateau 10.1 Cold Deserts 10 North American Deserts (Griffith, 2006). USGS: Colorado Plateau Province (Navajo and Datil Section) Southern Rocky Mountains Basin and Range (Mexican Highland and Sacramento Section)

Ecological site concept

The 36XB ecological site was drafted from the existing R036XB008NM – Meadow range site MLRA 36XB (NRCS, 2003). This site is commonly located on on stream terrace, valley floors and alluvial flats positions. The soils are deep, somewhat poorly to poorly drained. The seasonal water table fluctuates between 12 and 40 inches for most of the growing season. The surface layers are silty clay loam, clay loam, loam, and gravelly loam. The substratum is stratified loam, silt loam, silty clay loam, clay loam, very gravelly sand, and gravelly sand. It has an aridic ustic/ustic arid moisture regime and mesic temperature regime. The effective precipitation ranges from 10 to 16 inches.

Associated sites

F036XA005NM	Riverine Riparian Site has a water table at 12-36" Landforms are V-shaped valleys, U-shaped valleys and overflow Stream (channel).
R036XB002NM	Clayey Clayey - Slopes are 0-15%; Soils are moderately deep to deep; soil surface loam, clay loam, silty clay loam, and silty clay over clayey subsoil with textures of clay loam, clay to silty clay loam or silty clay. Landforms are stream terraces, valley floors, fan remnants, alluvial fans, dipslopes on cuestas, mesas, hills, and valley floors.
R036XB006NM	Loamy Slopes 1-15%; soils are very shallow to shallow and skeletal and not skeletal; soil surface are loam, stony to very stony loam, very cobbly loam, fine sandy loam, very cobbly fine sandy loam, stony silt loam, stony silty clay loam, and cobbly silty clay loam; Parent materials are basalt influences but can have sometimes influence from sandstone and/or shale. Landforms nearly level to gently sloping mesas, lava plateaus, lava flows, lava flows on valley floors, and ridges.
R036XB010NM	Salty Bottomland Water table 42-72" in depth; soils are deep, high in sodium, soils are gravelly to skeletal (15-35% rock fragments). Surface textures are loam, fine sandy loam, clay loam and silty clay loam with a subsoil of clay or clay loam. Landform is floodplain.
R036XB011NM	Sandy Slopes are 1-15%; soils are deep to very deep; Surface textures are loamy sand, gravelly loamy sand, loamy fine sand, fine sandy loam and sandy loam with sandy subsoil. Landforms are nearly level to gently sloping landscapes on dunes, fan remnant and alluvial fans.
R036XB017NM	Swale This site is enhanced by runoff during periods of high runoff (intermittent). The water table depth is greater than 6 ft. Soils are deep to very deep soils that have surface textures of loams, silt loams to clays with loamy subsoil. Landforms are broad valley bottoms, floodplains, and in depressions.

Similar sites

R036XB138NM	Marshy Water table 0-12" in depth; soils are deep; with soil textures from sandy loam to loamy sand with loamy subsoil. Landform stream and marsh on abandon channels on floodplains of valley floors with intermittent streams.
R036XB009NM	Salt Meadow Water table 36-72" in depth; slopes are 1-5%; soils are deep, Surface textures are loam, fine sandy loam, clay loam, silty clay loam with a subsoil of clay or clay loam. Landform is nearly level to gently sloping floodplains. This site is dependent on sub-irrigation and overflow for its moist condition. This site is affected by sodium.

R036XB017NM	Swale This site is enhanced by runoff during periods of high runoff (intermittent). The water table depth is greater than 6 ft. Soils are deep to very deep soils that have surface textures of loams, silt loams to clays with loamy subsoil. Landforms are broad valley bottoms, floodplains, and in depressions.
F036XA005NM	Riverine Riparian Site has a water table at 12-36" Landforms are V-shaped valleys, U-shaped valleys and Overflow Stream (channel).

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This sub-irrigated site is usually in a stream terrace, valley floors and alluvial flats positions. It may occur adjacent to streams, springs, and seeps. Sometimes it is locally known as a cienaga or vega. Slopes are relatively level to 5 percent. Elevation ranges from 6,500 to 7,500 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Valley floor (3) Alluvial flat
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	1,980 – 2,320 m
Slope	0 – 10 %
Water table depth	60 – 180 cm

Climatic features

This site has a semi-arid continental climate. There are distinct seasonal temperature variations. Mean annual precipitation varies from 10 to 16 inches. The overall climate is characterized by cold dry winters in which winter moisture is less than summer. Wide yearly and seasonal fluctuations are common for this climatic zone which can range from 5 to 25 inches. Of this, approximately 25-35% falls as snow, and 65-75% falls as rain between April 1 and November 1. The growing season is April through September. As much as half or more of the annual precipitation can be expected to come during the period of July through September. August is typically the wettest month of the year. The driest period is usually from November to April; and February is normally the driest month. During July, August, and September, 4 to 6 inches of precipitation influence the presence and production of warm-season plants. Fall and spring moisture is conducive to the growth of cool-season herbaceous plants and maximum shrub growth. Growth usually begins in March and ends with plant maturity and seed dissemination when the moisture deficiency and warmer temperatures occur in early June. There is also a period of growth in the fall. Summer precipitation is characterized by brief thunderstorms, normally occurring in the afternoon and evening. Winter moisture usually occurs as snow, which seldom lies on the ground for more than a few days. The average annual total snowfall is 29.1 inches. The snow depth usually ranges from 0 to 1 inches during the winter months. The highest snowfall record is 57.1 inches during the 1993-1994 winter. The frost-free period typically ranges from 110 to 145 days and the freeze free period is from 140 to 170 days. The last spring freeze is the middle of April to the first week of May. The first fall freeze is the middle of October to the first week of November. Mean daily annual air temperature is about 29°F to 69°F, averaging about 37°F for the winter and 67°F in the summer. The coldest winter temperature recorded was -20°F on January 6, 1971 and the warmest winter temperature recorded was 70°F on February 28, 1965. The coldest summer temperature recorded was 26°F on June 1, 1980. The hottest day on record is 100°F on July 9, 2003 and June 21, 1968. Data taken from Western Regional Climate Center (2017) for El Rito, New Mexico Climate Station.

Table 3 Representative climatic features

Frost-free period (average)	130 days
Freeze-free period (average)	150 days
Precipitation total (average)	330 mm

- (1) NAVAJO DAM [USC00296061], Navajo Dam, NM
- (2) SANTA FE 2 [USC00298085], Santa Fe, NM
- (3) CUBA [USC00292241], Cuba, NM
- (4) COCHITI DAM [USC00291982], Pena Blanca, NM
- (5) ABIQUIU DAM [USC00290041], Gallina, NM
- (6) LYBROOK [USC00295290], Dulce, NM
- (7) EL RITO [USC00292820], El Rito, NM

Influencing water features

This may be influenced by water from a stream, spring, or seep.

Soil features

The soils are deep, somewhat poorly to poorly drained. The seasonal water table fluctuates between 12 and 40 inches for most of the growing season. The surface layers are silty clay loam, clay loam, loam, and gravelly loam. The substratum is stratified loam, silt loam, silty clay loam, clay loam, very gravelly sand, and gravelly sand. Permeability is moderate to slow.

This ecological site is associated with the map units and soil components in the soil surveys listed below. Future updates to this soil survey may affect these associations. For up-to-date associations between soil components and this ecological site, refer to NASIS. Associations between ecological sites and soil components are maintained in NASIS via the ecological site ID.

This site is found in NM692, NM670, NM630 and NM678 soil survey. This ecological site has been correlated to the following soils with the listed particle control sections:

Fine-Loamy:
Bluewater
Caruso Variant
Poganeab

Fine-loamy over sandy or sandy-skeletal

Loveland

Fine:
Knifehill

Table 4. Representative soil features

Surface texture	(1) Silty clay loam (2) Clay loam (3) Loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Slow to moderate
Soil depth	50 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	10.92 – 20.83 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4

Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

MLRA 36 occurs on the higher elevation portion of the Colorado Plateau. The Colorado Plateau is a physiographic province which exists throughout eastern Utah, western Colorado, western New Mexico and northern Arizona. It is characterized by uplifted plateaus, canyons and eroded features. The Colorado Plateau lies south of the Uintah Mountains, north of the Mogollon transition area, west of the Rocky Mountains, and east of the central Utah highlands. The higher elevation portion of the Colorado Plateau which is represented by MLRA 36 is characterized by broken topography, and lack of perennial water sources. This area has a long history of past prehistoric human use for years. MLRA 36 shows archaeological evidence indicating that pinyon-juniper woodlands were modified by prehistoric humans and not pristine and thus were altered at the time of European settlement (Cartledge & Propper, 1993). This area also included natural influences of herbivory, fire, and climate. This area rarely served as habitat for large herds of native herbivores or large frequent historic fires due to the broken topography. This site is extremely variable and plant community composition will vary with the water fluctuations on this site.

The lower part MLRA 36 developed under climatic conditions that include hot, dry summers with summer rains showers and little to no snow with the mild winter temperatures. This area has climatic fluctuations and prolonged droughts are common occurrences. Between an above average year and a drought year. Forbs are the most dynamic component of this community and can vary up to 4 fold (Passey et.al. 1982). The precipitation and climate of MLRA 36 are conducive to producing Pinyon/juniper, and sagebrush complexes with high productive sites in the bottoms of the canyons. Predominant species on the Colorado Plateau are Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*), mountain big sagebrush (*A. tridentata* var. *vaseyana*), and black sagebrush (*A. nova*), basin big sagebrush (*A. tridentata* var. *tridentata*), Utah juniper (*Juniperus utahensis*), one-seed juniper (*Juniperus monosperma*), and two-needle pinyon (*Pinus edulis*). One-seed juniper has the capability to discontinue active growth when moisture is limited but can resume growth when moisture availability improves. This growth pattern may represent an important adaptation allowing them to survive on very arid sites. It is possible that small trees may be killed by drought; mature one-seed junipers are resilient to drought, especially in comparison to two-needle pinyon (Johnsen, 1962).

The productivity and composition of this plant community would have been quite stable, although varying with the climate because it would have been affected by runoff from streams originating at higher elevations in adjacent mountains. The water table usually persisted throughout the year, causing poorly-aerated soils. The water table is fed by spring snow melt, groundwater and monsoonal rains. Following very wet winters, the melting snow pack would have caused a high and widespread surge of flooding. Wet meadows are areas where it floods frequently or has a shallow water table with some wetland properties. Wet Meadows are a small portion of the landscape footprint. Less than 1% of the landscape in the southwest are characterized as wetlands and wet meadows is just one of several wetland types that occur (Ramstead, 2012). This site is important part of the landscape as it often serves as habitat for plants, birds and other wildlife.

Wet meadows in the southwest are one of the most altered ecosystem types by humans. They are used for livestock and wildlife grazing, many locations have small dams with ponds or stock tanks. In irrigated meadows, roads are commonly built through or adjacent to them, they are prone to invasive species and can be impacted by wildfires in the surrounding upland areas. (Ramstead et al., 2012)

Meadows with tufted hairgrass as a major component are very sensitive to water table fluctuations. A study in Oregon showed that when the water table is lowered it favored increases in Kentucky bluegrass and perennial forbs in the species composition. While increase in the water table favored sedges and rush establishment. (Walsh, 1995) In the mountain west, Kentucky bluegrass is well adapted to the meadow with seasonally high water tables and midsummer drought. Kentucky bluegrass has become dominated on many meadows which once had a larger component of tufted hairgrass. (Uchytel, 1993)

Records of fire with wet meadows at lower elevations are rare to non-existent. The communities listed do not include wet meadows for fire regimes. In general, Intermountain riparian communities have been found to have a fire interval of 20 to 370 years (USDA, 2012a). While southwestern desert grasslands have a fire interval of 10-833 years (USDA, 2012b). Another source states that meadows have a fire return interval of 30 to 60 years (Landfire, 2007). The second source covers 2 ecological sites. It covers the upper precipitation end of wet meadow, and mountain meadows ecological site from an adjacent MLRA (48A). This site is not described in the fire regime literature that is available at this time. The data available is for general vegetation types in the United States: no specific data for wet meadows on Colorado Plateau is available at this time.

Variability in climate, soils, aspect and complex biological processes will cause the plant communities to differ. These factors contributing

to annual production variability include wildlife use, drought, and insects. Factors contributing to special variability include soil texture, depth, rock fragments, slope, aspect, and micro-topography. The species lists are representative and not a complete list of all occurring or potentially occurring species on this site. The species lists are not intended to cover the full range of conditions, species and responses of the site. The State & Transition model depicted for this site is based on available research, field observations and interpretations by experts and could change as knowledge increases. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. The following diagram does not necessarily depict all the transitions and states that this site may exhibit, but it does show some of the most common plant communities.

State and transition model

Figure 5. STM

Figure 6. Legend

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1				504-1009	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	504-1009	–
2				127-252	
	mountain brome	BRMA4	<i>Bromus marginatus</i>	127-252	–
3				127-252	
	muttongrass	POFE	<i>Poa fendleriana</i>	127-252	–
4				127-252	
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	127-252	–
5				252-504	
	sedge	CAREX	<i>Carex</i>	252-504	–
	rush	JUNCU	<i>Juncus</i>	252-504	–
6				252-757	
	giant sandreed	CAGI3	<i>Calamovilfa gigantea</i>	252-757	–
7				76-127	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	76-127	–
Forb					
8				76-127	
	clover	TRIFO	<i>Trifolium</i>	76-127	–
9				76-127	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	76-127	–
	silverweed cinquefoil	ARAN7	<i>Argentina anserina</i>	76-127	–
	gentian	GENTI	<i>Gentiana</i>	76-127	–
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	76-127	–
	goldenbanner	THERM	<i>Thermopsis</i>	76-127	–
Shrub/Vine					
10				0-127	
	gentian	GENTI	<i>Gentiana</i>	76-127	–
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	0-127	–
	desert willow	CHILO	<i>Chilopsis</i>	0-127	–

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 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.2 plant community composition

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

Habitat for Wildlife: This site provides habitats which support a resident animal community that is characterized by raccoon, golden-mantled ground squirrel, meadow vole, meadowlark, blackbirds, garter snake, and leopard frog. Migrating waterfowl and wading birds use streams and wetlands associated with these sites. Mule deer and elk will move out of adjacent habitats in late winter to feed on early green forage.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups. Hydrologic Interpretations Soil Series-----Hydrologic Group Bluewater-----D Knifehill-----C

Recreational uses

No Data

Wood products

This site has no significant potential for wood product production.

Other products

Grazing: Approximately 90 to 95 percent of the vegetation produced on this site comes from plants producing forage suitable for grazing or browsing. Due to the high availability of soil moisture, which results in early green up and high productivity, this site is subject to deterioration by overgrazing and trampling. Deterioration is indicated by a decrease in western wheatgrass, tufted hairgrass, brome spp., and bluegrass with an increase in mat muhly, sedges, rushes, and forbs. A planned grazing system with periodic deferment is best to maintain the desirable balance between plant species and a high productivity.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month Similarity Index-----Ac/AUM 100 - 76-----0.9 – 1.2 75 – 51-----1.1 – 1.8 50 – 26-----1.6 – 4.8 25 – 0-----4.8+

Inventory data references

Data collection for this site was done in conjunction with the progressive soil surveys within the New Mexico and Arizona Plateaus and Mesas 36 Major Land Resource Area of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: McKinley & Sandoval Characteristic Soils are: Bluewater, Caruso, Poganeab

Type locality

Location 1: Rio Arriba County, NM

Other references

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Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	01/16/2025
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:
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17. Perennial plant reproductive capability:
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