

Major Land Resource Area 035X

Colorado Plateau

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Description

MLRA 35 covers approximately 60 percent of the Colorado Plateau Province. It generally consists of flat-lying to gently tilted Mesozoic and Paleozoic sedimentary formations that have been uplifted, allowing the Colorado River and its tributaries to cut deep canyons through the formations' layers. The major landforms include gently sloping to strongly sloping plains, volcanic plugs, steep scarps, and deeply incised canyons. The Colorado Plateau demonstrates the power of wind and water to erode soil and rock over time. Not only are deeply incised canyons evidence of erosion, but also isolated mesas and buttes testify to the enormous amount of material removed by the Colorado River and its tributaries. MLRA 35 is bounded to the south by the Mogollon Rim and associated volcanic landforms of the Mogollon Transition area (MLRA 39). The Mogollon Rim is a long, erosional escarpment stretching diagonally across Arizona and into New Mexico. It marks the boundary where the horizontal stratigraphy of the Colorado Plateau falls into the faulted and broken landscape of the Mogollon Transition. Volcanic landforms, such as the San Francisco Peaks and White Mountains, are in MLRA 39 while horizontal sedimentary formations, such as the Kaibab and Chinle Formations, are in MLRA 35. Part of the western boundary of MLRA 35 is shared with MLRA 30, the Mohave Basin and Range. A principal difference is the change from flat-lying sedimentary beds of the Colorado Plateau region to faulted, block mountains and valleys of the Basin and Range Province. The boundary with MLRA 30 lies at the base of the Grand Wash Cliffs and the Music Mountains to the south, the entrance to the Grand Canyon in the central area, and the base of the Shivwits Plateau in the north. It is marked by the lower alluvial Hualapai Valley and has a drier climate with thermic temperatures. In contrast, MLRA 35 lacks thermic temperatures except within the Grand Canyon. The northwest boundary is shared with the southern part of MLRA 47, which is dominated by fault-bounded, lava-capped plateaus, such as the Markagunt and Paunsaugunt, with the exception of the Table Cliffs Plateau, which is limestone capped. The underlying sedimentary strata in MLRA 47 are the same geologic units as the Colorado Plateau but elevations are mostly higher and temperatures cooler. The eastern boundary of 35 is shared with MLRA 42B, the Southern Rio Grande Rift. The boundary of MLRAs 35 and 42B lies near the base of various ridges that roughly parallel the rift. MLRA 42B has Quaternary and Tertiary geology associated with the rifting and filling of large tectonic basins along the Rio Grande Valley. MLRA 35 is in Arizona (56 percent), Utah (22 percent), New Mexico (21 percent), and Colorado (1 percent). It makes up about 71,735 square miles (185,885 square kilometers) and 46 million acres.

Geographic subunits

Land Resource Unit 1 The Central Colorado Plateau LRU can be considered the heart of MLRA 35. It is dominated by Mesozoic sedimentary geology, mostly sandstone and shale. It begins to the north with the canyons and plateaus surrounding the confluence of the Green and Colorado Rivers in Utah and extends south to the Little Colorado River Basin in Arizona. It includes the sand sheet of the Green River Desert; the mesas and benches of the Blue Hills; the structural anticlines, monoclines, and structural benches of the Circle Cliffs; a large laccolith thrust through a shallow syncline called the Henry Mountains; the Kaiparowits Plateau with its cretaceous sandstones overlying escarpments of soft marine shales; The Chinle Valley, a broad basin; the Grand Staircase with its series of cliffs and structural benches; Black Mesa Navajo Mountain, a series of broad mesas with one large laccolith; and the Paria and Kaibeto Plateaus. The soils are continually stripped of their cover and, due to uplift forces most positions, are erosional in nature. The overwhelmingly shallow soils are predominantly an exudium, continually being uplifted, weathered from rock, and transported regionally from the MLRA.

Land Resource Unit 2 The western Colorado Plateau LRU is strongly characterized by its limestone and dolomite cap, known as the Kaibab formation. Physiographically, this subdivision is affected by the combination of regional uplift and the deeply incised Colorado River at the Grand Canyon. The Grand Canyon is surrounded by adjacent plateaus: the Kaibab Plateau on the North Rim, the Arizona Strip with the Shivwits Plateau to the northwest, and the Coconino Plateau on the South Rim. Marble Canyon is a narrow northerly extension of the Grand Canyon. The Coconino Transition represents a northwesterly extension of the Mogollon Rim that is more protected from monsoonal moisture. The Coconino Transition is largely Redwall Limestone and has isolated volcanic and granitic soils.

Land Resource Unit 3 The Northwest New Mexico Highlands LRU is primarily non-marine sedimentary hills and mountains that have been affected by regional uplift of the Colorado Plateau. Physiographically, it represents higher elevations than the Central Colorado Plateau subdivision to the west and lower elevations than the volcanic mountains of MLRA 39 to the south. The highlands include Nacimiento sediments derived from Cenozoic relict lakebeds; the Chuska Mountains, a mountain ridge of upturned sedimentary beds and sandstone; the Defiance Plateau with its uplifted sedimentary beds of Permian sandstone and Triassic shale; the Zuni Mountains, an area of tilted ridges of mountains and various structurally contorted sedimentary formations; Bidahochi sediments with broadly scattered low mesas and hills; and a diverse collection of small basins, mountains, and valleys. Parent material is nonmarine sediments and mixed sedimentary rock in the southeast. The highlands have shallow soils and rock outcrops on structural benches and mesas.

Land Resource Unit 4 The San Juan Basin LRU is almost exclusively marine shale sediments, including Menefee Shale and Lewis Shale. Physiographically, it represents lower elevations than the New Mexico Highlands at the Chuska Mountains to the west, the Nacimiento Mountains to the east, and Mount Taylor and the Zuni Mountains to the south. This subdivision includes the San Juan River corridor, the Bisti Lowlands with the Chaco River Valley and surrounding shale basin, and Chaco Mesa with its extension of Menefee Shale. This subdivision has shallow soils and, near the Chaco River and major rivers to the north, deeper alluvial soils. The expanse is affected by regional uplift of the Colorado Plateau.

Ecological site group keys

MLRA 35 Key to the LRUs

I >75% bedrock outcrop ... 035XESG23 – Outcrops

II. <75% bedrock outcrop

A. Perennial water ... 035XESG24 – Riparian

B. Ephemeral water or uplands

1 Aridic moisture regime

i. Cryic, frigid, or mesic temperature regimes

a. Additional water

1) Subsurface EC>4 ... 035XESG08 – Arid Cool Saline Bottoms

2) Subsurface EC<4

a) Sand >50% & clay <25% for surface and subsurface ... 035XESG11 – Arid Cool Sandy Bottoms

b) Sand <50% or clay >25% for surface and subsurface ... 035XESG01 – Arid Cool Bottoms

b. Uplands

1) Surface SAR>8 ... 035XESG09 – Arid Cool Saline Hills

2) Surface SAR<8

a) Gypsum >5% surface or >10% subsurface ... 035XESG06 – Arid Cool Gypsum

b) Gypsum <5% surface and <10% subsurface

(1) Subsurface EC>8 or surface EC>4 ... 035XESG09 – Arid Cool Saline Hills

(2) Subsurface EC<8 and surface EC<4

(a) EC >1.5 surface or >2 subsurface ... 035XESG10 – Arid Cool Saline Uplands

(b) EC <1.5 surface and <2 subsurface

(1) Slope >35% & >40% surface rock ... 035XESG02 – Arid Cool Breaks

(2) Slope <35% or <40% surface rock

(a) Depth <30cm ... 035XESG14 – Arid Cool Very Shallow

(b) Depth: 30-55cm ... 035XESG13 – Arid Cool Shallow

(c) Depth >55cm

(1) Rock >30% surface or >30% subsurface ... 035XESG04 – Arid Cool Deep Rocky

(2) Rock <30% surface and <30% subsurface

(a) Clay >30% surface or >35% subsurface ... 035XESG03(18113) – Arid Cool Clay Uplands

(b) Clay <30% surface and <35% subsurface

(1) Sand >75% or texture is loamy sand or sandier in surface & subsurface ...

035XESG12 – Arid Cool Sandy Uplands

(2) Sand <75% or texture is sandy loam or finer in surface & subsurface

(a) Clay <20% or texture is sandy loam or sandier in surface ...

035XESG07 – Arid Cool Loamy Uplands

(b) Clay >20% or texture is finer than sandy loam in surface ...

035XESG05 – Arid Cool Finer Uplands

ii. Thermic temperature regime

a. Additional water ... 035XESG18 – Arid Warm Saline Bottoms and Bottoms

b. Uplands

1) Gypsum >5% surface or >10% subsurface ... 035XESG17 – Arid Warm Gypsum

2) Gypsum <5% surface and <10% subsurface

a) EC >1.5 surface or >2 subsurface ... 035XESG19 – Arid Warm Saline Uplands

b) EC <1.5 surface and <2 subsurface

(1) Slope >35% & >40% surface rock ... 035XESG15 – Arid Warm Breaks

(2) Slope <35% or <40% surface rock

(a) Depth <30cm ... 035XESG22 – Arid Warm Very Shallow

(b) Depth: 30-55cm ... 035XESG21 – Arid Warm Shallow

(c) Depth >55cm

(1) Clay <20% or texture is sandy loam or sandier in surface ... 035XESG20 – Arid Warm Sandy Uplands and Loamy Uplands

(2) Clay >20% or texture is finer than sandy loam in surface ... 035XESG16 – Arid Warm Finer Uplands and Clay Uplands

2 Ustic moisture regime

i. Additional water

a. Subsurface EC>4 ... 035XESG30 – Semiarid Cool Saline Bottoms

b. Subsurface EC<4

1) Sand >50% & clay <25% for surface and subsurface ... 035XESG33 – Semiarid Cool Sandy Bottoms

2) Sand <50% or clay >25% for surface and subsurface ... 035XESG25 – Semiarid Cool Bottoms

ii. Uplands

a. Surface SAR>8 ... 035XESG31 – Semiarid Cool Saline Hills

b. Surface SAR<8

1) Gypsum >5% surface or >10% subsurface ... 035XESG29 – Semiarid Cool Gypsum

2) Gypsum <5% surface and <10% subsurface

a) Subsurface EC>8 or surface EC>4 ... 035XESG31 – Semiarid Cool Saline Hills

b) Subsurface EC<8 and surface EC<4

(1) EC >1.5 surface or >2 subsurface ... 035XESG32 – Semiarid Cool Saline Uplands, Sandy Uplands, Loamy Uplands, and Finer Uplands

(2) EC <1.5 surface and <2 subsurface

(a) Slope >35% & >40% surface rock ... 035XESG26 – Semiarid Cool Breaks

(b) Slope <35% or <40% surface rock

(1) Depth <30cm ... 035XESG35 – Semiarid Cool Very Shallow

(2) Depth: 30-55cm ... 035XESG34 – Semiarid Cool Shallow

(3) Depth >55cm

(a) Rock >30% surface or >30% subsurface ... 035XESG28 – Semiarid Cool Deep Rocky

(b) Rock <30% surface and <30% subsurface

(1) Clay >30% surface or >35% subsurface ... 035XESG27 – Semiarid Cool Clay Uplands

(2) Clay <30% surface and <35% subsurface ... 035XESG32 – Semiarid Cool Saline Uplands, Sandy Uplands, Loamy Uplands, and Finer Uplands