Major Land Resource Area 030X
Mojave Basin and Range

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Description

Major Land Resource Area (MLRA) 30, Mojave Desert, is found in southern California, southern Nevada, the extreme southwest corner of Utah and northwestern Arizona within the Basin and Range Province of the Intermontane Plateaus. This unit is characterized by broad basins, valleys, and old lakebeds. Widely spaced mountains trending north to south occur throughout the area. Isolated, short mountain ranges are separated by an aggraded desert plain. The mountains are fault blocks that have been tilted up. Long alluvial fans coalesce with dry lakebeds between some of the ranges.

Geographic subunits

Land Resource Unit 1. Land Resource Unit (LRU) 30-AZ1, Lower Mohave Desert. Elevations range from 400 to 2500 feet and precipitation averages 3 to 6 inches per year. Vegetation includes creosotebush, white bursage, Mormon tea, and brittlebush. The soil temperature regime is hyperthermic and the soil moisture regime is typic aridic.

Land Resource Unit 2. Land Resource Unit (LRU) 30-AZ2 – Middle Mohave Desert. Elevations range from 1500 to 3200 feet and precipitation averages 6 to 9 inches per year. Vegetation includes creosotebush, white bursage, yucca, prickly pear and cholla species, Mormon tea, flattop buckwheat, ratany, winterfat, bush muhly, threeawns, and big galleta. The soil temperature regime is thermic and the soil moisture regime is typic aridic.

Land Resource Unit 3. Land Resource Unit (LRU) 30-AZ3 – Upper Mohave Desert. Elevations range from 2800 to 4500 feet and precipitation averages 9 to 12 inches per year. Vegetation includes Joshua tree, blackbrush, creosotebush, ratany, bush muhly, big galleta, black grama, desert needlegrass, and Indian ricegrass. The soil temperature regime is thermic and the soil moisture regime is typic aridic.

Ecological site keys

Volcanic-surface geology is clearly of volcanic origin

I. Landforms are extrusive volcanic hills, mountains, or plateaus

A. Slope is greater than 30 percent

1 Soils are moderately deep to a lithic contact.

i. Soils have an argillic diagnostic subsurface horizon ... R030XA045CA – Volcanic Hill

2 Soils are very shallow to shallow to a lithic conctact.

i. Total surface cover of all rock fragments (gravels, cobbles, and stones) is greater than 60 percent. ... R030XB072NV – STONY SLOPE 5-7 P.Z.

ii. Stones and boulders over 10 inches wide and rock outcrop compose greater than 15 % of the surface cover ... R030XB067NV – BOULDERY HILL 5-7 P.Z.

iii. The soil of this ecological site is very shallow to shallow. The soil's patent material is andesite alluvium and colluvium. ... R030XB243CA – Andesite Hills

iv. An argillic horizon occurs from 4 to 15 inches. Depth to bedrock is 4 to 20 inches. ... R030XC236CA – Lithic Slopes

3 Very deep soils (greater than 60 inches) with an argillic horizon, generally less than 15% cobbles and stones. ... R030XC234CA – Fine-Loamy Very Deep Slopes

B. Slope is typically less than 30%

1 Soils are typically shallow to moderately deep over a lithic contact.

i. Total surface cover of all rock fragments (gravels, cobbles, and stones) is greater than 60 percent. ... R030XB070NV – VOLCANIC HILL 5-7 P.Z.

ii. Stones and boulders over 10 inches wide and rock outcrop compose less than 15 % of the surface cover. ... R030XB073NV – VOLCANIC SLOPE 5-7 P.Z.

iii. Basalt Lava Flow

a. Surface textures are extremely gravelly fine sandy loams. Subsurface textures are loams. ... R030XB130CA – Lava Flow 3-5

b. Generally greater than 15% boulders AND rock outcrop on the surface. Soils are calcareous and alkaline, with calcium carbonate accumulation in subsurface horizons ... R030XD152CA – Hyperthermic Saline Hill

2 Soils are deep to a lithic contact.

i. Soils have a calcic and an argillic horizon and are strongly to moderately alkaline. ... R030XB066NV – BASALTIC FAN 5-7 P.Z.

LRU 30-1 AZ

I. Flooded (bottom position, or receives additional moisture from the valley-side or over-bank) and/or having a water table within reach of plant roots

A. Flooding occurrence is at least rare; occurs on floodplain or low terrace of drainage way

1 Soil surface clay loam to clay 4 to 10 inches thick. Less than 15 percent coarse fragments in soil profile ... R030XA103AZ – Clayey Bottom 3-6" p.z.

2 Soil surface loam, fine sandy loam, or silt loam 4 to 8 inches thick ... R030XA110AZ – Loamy Bottom 3-6" p.z.

3 Soil surface sandy loam to clay 6 to 12 inches thick. Soluble salt accumulations are high ... R030XA111AZ – Saline Bottom 3-6" p.z.

4 Soil surface very gravelly loamy sand, very cobbly coarse sand, or gravelly loamy sand. Subsurface extremely gravelly loamy coarse sand, extremely gravelly coarse sand, very gravelly coarse loamy sand, gravelly loam sand, and/or extremely gravelly loamy sand ... R030XA115AZ – Sandy Wash 3-6" p.z.

B. Flooding occurrence is at least occasional and there is a water table during the growing season

1 Soil surface very gravelly loamy coarse sand or very stony loamy coarse sand. Subsurface stony and/or extremely gravelly loamy coarse sand. Soil slightly to strongly effervescent ... R030XA112AZ – Sandy Terrace 3-6" p.z.

2 Soil surface very cobbly to gravelly loamy sand. Subsurface extremely loamy coarse to extremely gravelly loamy coarse sand ... R030XA125AZ – Sandy Bottom 3-6" p.z. Wet

II. Not Flooded (upland position, receives only precipitation)

A. Slopes Generally Less Than 15%

1 Soil surface gravelly loam to very gravelly loam 2 to 6 inches thick. Soil is shallow to moderately deep to a layer high in lime content ... R030XA108AZ – Limy Upland 3-6" p.z.

2 Soils Moderately Deep or Deeper

i. Soils calcareous

a. Soils skeletal, gravelly ... R030XA109AZ – Limy Upland 3-6" p.z. Deep

b. Soils skeletal, cobbly ... R030XA116AZ – Cobbly Limy Upland 3-6" p.z. Deep

c. Soils not skeletal ... R030XA105AZ – Limy Fan 3-6" p.z.

d. Soils fine sand, eolian ... R030XA121AZ – Limy Fan 3-6" p.z. Sandy

ii. Soils not calcareous throughout

a. Soil surface sandy loam, not skeletal throughout ... R030XA114AZ – Sandy Loam Upland 3-6" p.z.

b. Soils sand throughout, occurs as stable dunes ... R030XA113AZ – Sandy Upland 3-6" p.z.

B. Slopes Generally Greater Than 15 percent

1 Soils very shallow, shallow to moderately deep

i. Parent material is basalt, exposed bedrock is nearly black in color ... R030XA101AZ – Basalt Hills 3-6" p.z.

ii. Parent material is mixed igneous and metamorphic alluvium. ... R030XA120AZ – Sandy Loam Hills 3-6" p.z. Limy, Gravelly, Shallow

iii. Hard granite of gneiss bedrock at 6 to 16 inches ... R030XA104AZ – Granitic Hills 3-6" p.z.

iv. Andesite bedrock at 9 to 13 inches ... R030XA118AZ – Volcanic Hills 3-6" p.z.

2 Soils moderately deep to deep

i. Terraces adjacent to the Colorado River; soil textures variable ... R030XA102AZ – Breaks 3-6" p.z.

ii. Summits and backslopes of fan terraces ... R030XA107AZ – Limy Slopes 3-6" p.z.

iii. Soil with visible gypsum crystals ... R030XA123AZ – Gypsum Hills 3-6" p.z.

Mountains, Foothills, and Plateaus-non volcanic, bedrock controlled landforms

I. Generally > 3300 in elevation; mean annual air temperature is between 13oC (55.5 oF) and 17oC (62.5 oF)]; effective precipitation is between -800 to -400 mm (-31.5 to -15.75 inches); generally an increase in both the number of species and abundance of perennial grasses and other shrubs occurs in these regions compared to the more arid regions.

A. Shallow soils to a lithic or paralithic contact or a shallow argillic or calcic horizon

1 Colluvium and residuum derived from igneous and plutonic metamorphosed material

i. Surface fragments larger than 10 inches cover less than 20% of the surface ... R030XA036CA – Shallow Granitic Hill

ii. Surface fragments larger than 10 inches cover less than 20% of the surface. December and January average minimum temperatures are above 32 degrees Fahrenheit (0 C) ... R030XB076NV – SHALLOW GRAVELLY SLOPE 6-8 P.Z.

iii. Surface fragments larger than 10 inches cover less than 20% of the surface. December and January average minimum temperatures are below 32 degrees Fahrenheit (0 C) ... R030XA055CA – Calcareous Hill

iv. Surface fragments larger than 10 inches cover more than 20% of the surface

a. Colluvium and residuum from granodiorite ... R030XB151CA – Shallow Gravelly Loam 5-7" P.Z.

b. alluvium derived from granite and/or residuum weathered from granite on dissected pediment surfaces. ... R030XB171CA – Dissected Pediment

c. Slopes are generally greater than 30 percent. Creosote bush (Larrea tridentate) and Parish's goldeneye (Viguiera parishi) dominate the site, but a high diversity of other shrub species may be present. ... R030XB172CA – Warm Gravelly Shallow Hills

d. Slopes are typically 15 to 75 percent. Elevations are 5100 to about 8900 feet. Site supports pinyon-juniper ... F030XC238NV – Shallow Metamorphic Mesic Mountains

e. This ecological site occurs on moderately sloping, undulating low hills or rock pediment. Soils are very shallow to shallow, and have loamy skeletal textures. ... R030XC002CA – Shallow Loamy-Skeletal Ustic Low Slopes

f. There is a high percentage of granitic rock outcrops throughout the site, with very shallow to shallow sandy soils on open expanses of slope between outcrops. Single-leaf pinyon pine (Pinus

monophylla), California juniper (Juniperus California) and Muller's oak (Quercus cornelius-mulleri) are dominant around rock outcrops, and blackbrush (Coleogyne ramosissima) is dominant on shallow soils among outcrops. ... R030XB170CA – Bouldery Very Shallow To Shallow Gravelly Slopes

g. With the exception of the Seanna series, there is an argillic horizon within 5 inches of the soil surface. ... R030XB193CA – Very Shallow To Moderately Deep Gravelly Slopes

v. . Stones and boulders over 10 inches wide and rock outcrop compose less than 15 % of the surface cover. Slopes >15% ... R030XB140CA – Shallow Hill 4-6" P.Z.

vi. Cobbles, stones and boulders over 3 inches wide and rock outcrop cover less than 15 % of the soil surface. Greater than 15% slope ... R030XB056NV – SHALLOW GRANITIC SLOPE 5-7 P.Z.

vii. The site is dominated by blackbrush (Coleogyne ramosissima) and Utah juniper (Juniperus osteosperma). ... R030XC189CA – Bi-Modal Semi-Arid Shallow Cool Hills

viii. Single-leaf pinyon pine (Pinus monophylla) and Muller oak (Quercus cornelius-mulleri) dominate. ... R030XE196CA – Sandy Xeric-Intergrade Slopes

2 Colluvium and residuum derived from limestone or dolomite

i. Surface fragments larger than 10 inches cover less than 15% of the surface ... R030XA035CA – Sedimentary Hill

ii. Surface fragments larger than 10 inches cover less than 15% of the surface plus soils are higher in Ph creating a shadscale community. ... R030XB002NV – LOAMY HILL 5-7 P.Z.

iii. Cobbles, stones and boulders over 3 inches wide and rock outcrop cover more than 15 % of the soil surface ... R030XB068NV – LIMESTONE HILL 5-7 P.Z.

iv. Cobbles, stones and boulders over 3 inches wide and rock outcrop cover less than 15 % of the soil surface. Site is a blackbrush site. ... R030XB135NV – Steep Limestone Hill

v. Stones and boulders over 10 inches wide and rock outcrop compose less than 15 % of the surface cover. White bursage and big galleta dominate the reference plant community. ... R030XB123NV – LIMESTONE SLOPE 5-7 P.Z.

vi. Cobbles, stones and boulders over 3 inches wide and rock outcrop cover more than 15 % of the soil surface. Within the Colorado River Watershed. ... R030XB112NV – STONY LIMESTONE SLOPE 5-7 P.Z.

vii. Very shallow (less than 25 cm deep) soils over exposed bedrock ... R030XC036NV – STEEP GRAVELLY SLOPE 9-11 P.Z.

viii. Site is above 8500 feet

a. Site is <15% slope ... F030XC279NV – Pinus ponderosa var. scopulorum-Juniperus scopulorum/Cercocarpus ledifolius var. intermontanus/Bouteloua gracilis

b. Site is >15% slopes ... F030XC284NV – Pinus longaeva-Pinus flexilis/Juniperus communis var. depressa/Carex rossii

c. Site is >15% slopes; site is mostly on south facing aspects. ... F030XC287NV – Pinus ponderosa ssp. scopulorum-Abies concolor var. concolor/Ericameria compacta/Pseudoroegneria spicata ssp. spicata

d. Site is above 10,000 Ft ... R030XC028NV – ALPINE SLOPE

e. This site occurs on high windswept ridges and shoulders of mountains. Slopes range from 8 to 75 percent, but slopes of 15 to 50 percent are most typical. Elevations range from 9600 to 9933 feet. ... R030XC030NV – MOUNTAIN RIDGE

ix. Forested site between 6500 feet (2000 m) and 7500 feet (2300 m). Slopes >15%. Mostly northern aspects. ... F030XC252NV – LIMESTONE SLOPES

x. The soils associated with this site are shallow to bedrock. Slope gradients from 30 to 40 percent is most typical. ... R030XC040NV – STEEP NORTH SLOPE 9-11 P.Z.

xi. Site is shallow to a lithic contact and surface fragments larger than 10 inches cover < 15% of the surface. ... R030XC008NV – SHALLOW LIMESTONE SLOPE 7-9 P.Z.

3 Soils are formed in colluvium and residuum mostly from sandstone and are shallow to densic material. May also have some limestone

i. The dominant species are blackbrush (Coleogyne ramosissima), and creosote bush (Larrea tridentata). ... R030XB094CA – Shallow Limestone Hill

ii. Site is formed in residuum and colluvium derived from mudstone, or gypsiferous sandstone and siltstone. Reaction is moderately to strongly alkaline. ... R030XB116NV – SHALLOW PEDIMENT 3-5 P.Z.

iii. The soils associated with this site are shallow to very shallow to sandstone bedrock. Slopes typically range from 15 to about 75 percent. Elevations are 3700 to about 7020 feet.The reference plant community is dominated by turbinella oak, manzanita, and black sagebrush. ... R030XC020NV – SHALLOW SANDSTONE HILL 11-13 P.Z.

iv. Elevations range from 4000 to 7000 feet. Soils are formed in residuum and colluvium from calcareous sandstone and siltstone. ... R030XC027NV – SHALLOW GRAVELLY SANDSTONE 7-9 P.Z.

B. Soils deep to very deep

1 Slopes are greater than 15%

i. Soils derived from gypsiferous sedimentary rocks ... R030XB003NV – GYPSIC LOAM 5-7 P.Z.

ii. Parent material derived from non-foliated metamorphic rock types ... F030XC254NV – PIMO-JUOS/ARTRV

II. Generally < 3300 ft; mean annual air temperatures > 17 oC (62.5 oF)]; effective precipitation is between -1300 to -800 mm (-51 to -31.5 inches).

A. Slope >15%

1 Colluvium and/or residuum derived from igneous and foliated metamorphosed material where soils are shallow and/or a shallow diagnostic subsurface horizon is present (within top 50 cm). This keys out to both R030XA054NV and R030XA046CA. Soils have an argillic horizon. ... R030XA054NV – Limy Hill 5-7 P.Z.

2 Soils are slightly to moderately alkaline. Soils do not have an argillic diagnostic horizon. ... R030XA029CA – Shallow Limy 5-7

3 Gypsic horizon present ... R030XB118NV – GYPSIC HILL 3-5 P.Z.

4 52’ Gypsic horizon is not present with a very shallow depth to a sandstone lithic contact. ... R030XB113NV – SANDSTONE HILL 3-5 P.Z.

5 The dominant soils associated with this ecological site are very shallow to shallow, and formed from alluvium derived from granitoid and/or residuum weathered from granitoid. ... R030XB164CA – Steep South Slopes

6 The soils have formed in residuum and colluvium from calcareous sandstone and limestone. ... R030XB127NV – SHALLOW SANDSTONE SLOPE 3-5 P.Z.

7 They are formed in residuum and colluvium from sandstone conglomerate. ... R030XB124NV – SHALLOW HILL 3-5 P.Z.

8 Colluvium and residuum derived from igneous and foliated metamorphosed material where soils are shallow and/or a shallow diagnostic horizon is present ... R030XB139CA – Shallow Dry Hill 4-6 P.Z.

9 The soils are formed in residuum and colluvium from calcareous sandstone and limestone. ... R030XB125NV – CHANNERY HILL 3-5 P.Z.

10 < 15% boulders and rock outcrop, with elevations ranging from 950 to 2390 feet. ... R030XD001CA – Hyperthermic Dry Hills

11 This site is associated with hot landscape positions, typically occurring on south-facing aspects, but at lower elevations it may occur on all aspects. ... R030XD003CA – Hyperthermic Steep South Slopes

12 Generally less than 15% cover of stones and boulders. These soils occur on mountain slopes and hills and formed from colluvium and residuum derived from granite and gneiss over bedrock. ... R030XD004CA – Low-Production Hyperthermic Hills

B. Slope < 15%

1 Soils are shallow, have an argillic horizon and formed in residuum from granodiorite. ... R030XA043CA –

Calcareous Hill

2 Soils are shallow and exist on rock pediments with less than 5 percent slope. Soils are shallow and formed in residuum from granodiorite. There is no argillic horizon. ... R030XA030CA – Shallow Loam 5-7

3 This site occurs on flat-topped summits of mesas and plateaus overlying tertiary sediments. ... R030XB110NV – TABLELAND 3-5 P.Z.

4 Parent material is derived from sedimentary materials. Cobbles, stones and boulders over 3 inches wide and rock outcrop cover less than 15 % of the soil surface. ... R030XB086CA – Gravelly Pediment

5 The dominant soils associated with this ecological site are very shallow to shallow, and formed in colluvium derived from granitoid over residuum weathered from granitoid, or in residuum weathered from granitoid. ... R030XB225CA – Warm Sloping Pediments

C. Soils derived from gypsiferous sedimentary rocks.

1 Pediment or landforms less than 15% slope ... R030XB115NV – GYPSIC SODIC LOAM 3-5 P.Z.

Streams-major basin and range drainage systems

I. Head waters are generally between 1100-1700 m (3600-5575 ft) and higher

A. Water table at or near the surface

1 Outer margins of stream terrace ... R030XB020NV – LOAMY BOTTOM

2 Immediately adjacent to perennial stream or river ... R030XB021NV – STREAMBANK

3 This site occurs on large sized (typically order 3) ephemeral drainageways with braided channels at elevations of approximately 4,000 to 6,000 feet.These drainages provide a relatively consistent deep-water source, which supports desert willow communities. ... R030XY219CA – Ustic Ephemeral Drainageway Order 3

4 This site occurs on large sized (typically order 3) ephemeral drainageways with braided channels at elevations of approximately 3,000 to 4,500 feet.These large drainages provide a relatively consistent deep-water source, which supports desert willow communities. ... R030XY222CA – Typic Aridic Ephemeral Drainageway Order 3 4-7" p.z.

5 [Criteria]

B. No water table at or near the surface. This ecological site describes the complex dynamics of first and second order ephemeral streams with disturbances dominated by flash flood events. ... R030XB186CA – Mid Size Thermic To Hyperthermic Ephemeral Stream

C. Water table not near the surface.

1 Drains upper fan piedmont slopes Order 2-3 ephemeral stream ... R030XC047CA – Bi-Modal Semi-Arid Order 3 Ephemeral Wash

2 This ecological site occurs on narrow, gently sloping, first and second order ephemeral drainageways. The soils associated with this site are very deep, sandy soils formed in alluvium from metamorphic and sedimentary rock. ... R030XY227CA – Sandy Thermic Narrow Channels

3 Elevations range from 4000 to 6000 feet. ... R030XC032NV – UPLAND WASH

4 This ecological site occurs on moderate sized (generally order 2) ephemeral drainageways and associated landforms at elevations of 3,410 to 5,510 feet. ... R030XY220CA – Ustic Ephemeral Drainageways Order 2

II. Head waters are generally below 1100 m (3600 ft)

A. Stream order is greater than 2

1 Stream order is 2-4

i. This site often begins at slope break between steeper mountains and aggrading alluvial fans, or where two second order streams merge. These drainages provide a relatively consistent deep-water source, which supports desert willow communities. ... R030XB167CA – Large, Sandy, Thermic, Ephemeral Stream

ii. The main channels provide a deep water source and a frequent flooding regime, which support desert willow (Chilopsis linearis), catclaw acacia (Acacia greggii) and smoketree (Psorothamnus spinosus). ... R030XD010CA – Frequently Flooded, Gravelly, Hyperthermic To Warm-Thermic Ephemeral Stream

Alluvial Fans-including ballenas, fan remnants, inset fans, fan aprons, and fan skirts

I. Inset fan and fan draingeways

B. Site is generally greater than 3600 ft. in elevation

1 There are very high amounts (greater than 60 percent surface cover) of boulders, stones or cobbles at the surface. ... R030XB052NV – RUBBLY OUTWASH

2 This ecological site is located in drainageways and on stream terraces. These landforms are occasionally to frequently flooded. California broomsage is the dominant species and is generally found in sandy or gravelly washes ... R030XA042CA – Sandy Wash

3 Site drains limestone parent material, is over 6000 ft and supports a fourwing saltbush-mountain big sagebrush community. ... R030XC033NV – SANDY LOAM 9-11 P.Z.

4 The soils associated with this site are deep to very deep, well drained, and formed in alluvium derived from limestone. Elevations range from 5900 to 6600 feet. ... R030XC035NV – LOAMY 9-11 P.Z.

C. Site is generally lower than 3600 feet in elevation

1 Soils have a calcic horizon ... R030XB050NV – Calcic Dry Wash

2 Interfan drainageway with stream order 1-2.

i. Wash mainly drains alluvial fans where channel migration can occur ... R030XB187CA – Rarely Flooded Warm Thermic Ephemeral System

ii. Wash mainly drains hills and mountains where channel migration cannot occur ... R030XB028NV – VALLEY WASH

iii. . Stream order 1-2 and wash mainly drains soils with diagnostic subsurface horizons and is adjacent to hills or mountains; roughly plant hardiness zone 9b or higher ... R030XB103NV – Warm Dry Wash

iv. This site occurs on inset fans, drainageways and stream terraces (rarely on fan aprons) that drain stable fan remnants covered with desert pavement. ... R030XD021CA – Occasionally Flooded, Hyperthermic, Desert Pavement Ephemeral Stream

3 Inset Fan

i. These low elevations have a Plant Hardiness Zone 9b or warmer so that smoketree, typically found in the Sonoran Desert, is often present in these fluves. ... R030XB098NV – GRAVELLY OUTWASH

II. The upper Piedmont Slope consisting of the mountain valley fans, alluvial fans, and ballenas.

A. Generally on erosional fan remnants or ballenas in the upper fan piedmont where deeply incised washes dissect the landscape so that ephemeral streams can not migrate; well-developed diagnostic subsurface horizon are likely to be present within the top 25 cm of soil surface such as heavy clay or calcium carbonate accumulation OR shallow soils due to a duripan or densic horizon.

3 Moderately deep or shallower soils [< 40 inches (100 cm)] OR if soils are deeper than 20 inches (50cm), there is a diagnostic subsurface horizon acting as an aquatard within the top 20 inches of the soil profile

i. Alluvium from mixed sources with little to no alluvium from limestone sources, if a calcic or petrocalcic horizon is present, it is below 10 inches (25 cm) ... R030XB188CA – Cool Shallow to Moderately Deep Fans

ii. Alluvium from limestone OR a calcic or petrocalcic horizon within the top 25 cm of the soil surface ... R030XB230CA – Very Rarely Flooded Deep Fan Remnants

iii. a diagnostic subsurface horizon within the top 25 cm of soil surface such as heavy clay or calcium carbonate accumulation ... R030XB029NV – SHALLOW GRAVELLY LOAM 5-7 P.Z.

iv. Calcic or petrocalcic horizon is present ... R030XA001CA – Cool Loamy Fan Remnants 5-7

vi. Only a duripan is present (Sonoran Desert watershed) ... R030XB220CA – Very Shallow Duripan Fan Remnants

vii. . Alluvium contains gypsum ... R030XB104NV – COARSE SILTY 5-7 P.Z.

viii. Strong argillic horizon (clay increases greatly between horizons and is greater than 15% clay) is within top 25 cm of the soil surface AND no desert pavement present ... R030XB221CA – Loamy Fan Remnants And Pediments

ix. These soils have typically formed in alluvium from ignimbritic and basalt parent material. ... R030XB031NV – SHALLOW LIMY 5-7 P.Z.

x. Alluvium from limestone, dolomite, or conglomerate. Less than 15% slope. ... R030XC034NV – SHALLOW GRAVELLY LOAM 9-11 P.Z.

xi. Alluvium from limestone, dolomite, or conglomerate. Greater than 15% slope. ... R030XC043NV – SHALLOW CALCAREOUS SLOPE 9-11 P.Z.

xi. This site occurs on gently sloping alluvial fan remnants at elevations of approximately 3300 to 3900 feet. Soils have loamy to coarse loamy textures, and are shallow to moderately deep to a petrocalcic horizon. ... R030XB231CA – Shallow To Moderately Deep Petrocalcic Fan Remnants (Provisional)

xii. The soils of this site are derived from granite, schist or gneiss parent materials. These soils are shallow to moderately deep to an argillic horizon, a duripan, or a petrocalcic horizon. ... R030XB058NV – GRANITIC FAN 5-7 P.Z.

4 Moderately deep or deeper soils [> 40 inches (100 cm)]

i. Soils derived from limestone parent material.

a. Less than 15% slopes. Diagnostic subsurface horizon is present. ... R030XB038NV – GRAVELLY PEDIMENT 3-5 P.Z.

b. Less than 15% slope. Diagnostic subsurface horizon is not present. ... R030XB139NV – COBBLY FAN 5-7 P.Z.

c. Less than 15% slope. The soil profile is characterized by 50 to 75 percent rock fragments, mainly gravel with some cobbles and stones. ... R030XC041NV – GRAVELLY FAN APRON 9-11 P.Z.

d. < 15% slope and a pinyon-juniper site. ... F030XC288NV – Pinus monophylla-Juniperus osteosperma/Quercus gambelii-Cercocarpus ledifolius var. intermontanus/Poa fendleriana-Bouteloua gracilis

ii. Parent material is not derived from limestone

a. Vesicular pores in soil surface with greater than 80% gravel cover on the soil surface

1) Broken up patches of desert pavement OR weak desert pavement formation with vesicular horizons present OR greater than 80% large surface fragments (> 20 mm or ¾ inch) usually with a vesicular horizon

a) Less than 15% slope ... R030XB019NV – Eroded Fan Remnant Pavette 4-6 P.Z.

b) Greater than 15% slope ... R030XB099NV – GRAVELLY RIDGE 5-7 P.Z.

c) Slope <15%; The soil temperature regime is hyperthermic. ... R030XB078NV – BARREN HILL 3-5 P.Z.

2) Non-fragmented desert pavement, true desert pavement; virtually devoid of vegetation ... R030XB092NV – DESERT PATINA

b. No vesicular pores in soil surface and/or less than 80% gravel cover on the soil surface

1) Sodic horizon present ... R030XB138CA – Granitic Slope 3-5

2) No sodic horizon present ... R030XB083NV – BASALTIC FAN 3-5 P.Z.

3) A diagnostic subsurface horizon is present or an underlying horizon has a coarser texture than above horizons which prevents moisture from deep infiltration ... R030XC238CA – Bi-Modal Semi-Desert Deep Fans 8-10 inches

4) This ecological site occurs on channeled fan aprons and fan remnants, typically on the upper portion of the fan piedmont, at elevations of 950 to 2390 feet. ... R030XD041CA – Channeled

Warm Alluvial Fans

B. Buried fan remnants, non-buried fan remnants, fan aprons, or other landforms which are not an erosional fan remnant and where washes do not deeply dissect the landscape so that ephemeral streams do migrate.

1 Moderately deep or shallower soils [< 40 inches (100 cm)] OR if soils are deeper than 20 inches (50cm), there is a moderately deep or shallower diagnostic subsurface horizon acting as an aquatard

i. Alluvium from mixed sources with little to no alluvium from limestone sources

a. A natric subsurface horizon is present ... R030XA038CA – Sandy Fan

b. No natric subsurface horizon is present ... R030XA048CA – Shallow Fans 5-7

2 Moderately deep or deeper soils [> 40 inches (100 cm)], no diagnostic subsurface horizon is present

i. Soils are moderately deep or deeper and form in mixed alluvium from limestone, dolomite and shale. ... R030XA002CA – Calcareous Fan 5-7

3 Site does not receive sheet flow from higher elevations

i. Desert Pavement ... R030XD002CA – Desert Pavement

ii. This ecological site tends to occupy distal fan positions, far from sources of run-on, and this site typically has no sheet-flow from flash-flooding events but yet is not a desert pavement. ... R030XD006CA – Abandoned Fan

4 Site does receive sheet flow

i. < 15% cobbles on the surface ... R030XD015CA – Hyper-Arid Fans

ii. > 15% cobbles and stones on surface ... R030XD039CA – Coarse Gravelly Fans

III. The lower Piedmont slope consisting of the fan Piedmont and fan skirt.

A. Fan Piedmont

1 landforms which are not an erosional fan remnant and where washes do not deeply dissect the landscape so that ephemeral streams do migrate

i. Lacustrine terrace AND/OR soil surface likely originated from lake or marine deposits, including alluvium from lake or marine deposits ... R030XA012CA – Calcareous Loam 5-7

ii. The site is not a lacustrine terrace and an argillic subsurface horizon is present. ... R030XA020CA – Arid Fans 5-7

2 Site occurs on fan apron, a sheet-like mantle of relatively young alluvium and soils covering part of an older fan piedmont surface.

i. Argillic diagnostic horizon is present. ... R030XB174CA – Sandy Fan Aprons

ii. Diagnostic subsurface horizon not present, below 4000 ft. in elevation ... R030XB192CA – Very Rarely Flooded, Warm Thermic Fan Piedmonts

iii. 8’ Diagnostic subsurface horizon not present, elevation above 4000 ft. ... R030XB013CA – Loamy

3 Site occurs on erosionally active fan remnants

i. Site often has a root restricting layer such as a petrocalcic layer that can range in depth from shallow to deep. ... R030XB005NV – Arid Active Alluvial Fans

B. Fan Skirt

1 Dominant soils associated with this ecological site are very deep, and formed in alluvium derived from granitic sources. ... R030XB137CA – Granitic Loam

2 A root-restricting layer has formed due to pedogenesis.

i. Parent material is of sedimentary origin. ... R030XB241CA – Calcareous Loam

3 Soils are deep without a root-restricting layer.

i. The soils associated with this site are very deep alluvium derived from mixed igneous sources. Soil reaction is moderately to strongly alkaline. ... R030XD046CA – Fan Skirt

Basin Floor-including alluvial flat, alluvial plain, lake plain, and playa landforms

I. Site occurs as part of the alluvial flat.

A. Site is part of a lake plain, a nearly level surface marking the floor of an extinct lake.

1 Water table is within 30 feet causing the presence of mesquite. ... R030XA023CA – Loamy Bottom 5-7

2 Water table is below 30 ft. with no presence of mesquite. ... R030XA009CA – Alkali Flat 5-7

3 Water table is deeper than 30 ft and site exists on a lake plain (vegetated whereas playa floor is barren). ... R030XA096NV – COARSE SILTY 3-5 P.Z.

4 Saline and/or sodic soils

i. Relict alluvial flat ... R030XB025CA – Sodic Flat

ii. Water table is deeper than 30 ft. Inset fans within lake terrace, above the flood level of the flood-plain step and/or fan skirts over playa floor. ... R030XB114NV – SODIC LOAM 3-5 P.Z.

5 Some ponding likely, watershed size is less than 75,000 acres. ... R030XB047NV – ALLUVIAL PLAIN

6 Water table is below 30 feet. No ponding is evident. ... R030XB046NV – OUTWASH PLAIN

B. Material over and adjacent to lake plain

1 Site occurs on alluvium washed over a lake terrace. ... R030XA022CA – Loamy 5-7

2 Wash or inset fan closely associated with soils having a natric horizon ... R030XA023CA – Loamy Bottom 5-7

3 Site occurs on an upper lake terrace. ... R030XB049CA – Lake Terrace

4 Site occurs on a lower lake terrace. ... R030XB006NV – LOAMY 5-7 P.Z.

II. Site occurs as part of a playa

A. Water table within 30 ft (9m) of soil surface (Mesquite is often present)

1 . Soils with aquic conditions ... R030XB023CA – Saline Meadow

2 Soils without aquic conditions ... R030XB045CA – Lake Plain

3 This ecological site occurs on flat, frequently ponded playa margins where the water table is shallow to the soil surface. Occasional ponding that may be of long duration, a shallow water table, and salic soils in an extremely arid and warm climate on the edges of soft playa margins are the dominant features driving this ecological site. ... R030XD226CA – Alkaline Meadow

B. The site is subject to some flooding and ponding

1 Gypsic or salic horizon present ... R030XY129CA – Gypsic Flat 3-5" P.Z.

Sandsheets and sand dunes of eolian origin

I. Site occurs on basin floor

A. Site is associated with alluvial flat.

1 Sand dunes and sand sheets burying and adjacent to an alluvial flat, flood-plain step or similar fluvial landform ... R030XA016CA – Deep Sand 5-7

2 Soils are very deep and found on sand sheets developed from eolian deposition originating from lake or marine deposits. Soils are slightly to moderately alkaline. ... R030XA021CA – Limy Sand 5-7

3 This site occurs on sand sheets and alluvial plains near dry lake beds or playas. ... R030XA065NV – DRY WASH

B. Site is associate with playa dunes

1 Bedrock or old landforms likely buried where water table is perched high enough to support mesquite ... R030XY154CA – Dune 3-5" P.Z.

2 This site exists on fan deltas produced by a large ephemeral river draining into a dry lake. ...

II. Site occurs on the piedmont slope

A. Site is associated with the lower fan piedmont on the lower piedmont slope.

1 This site occurs on sand sheets, dunes, sand sheets on fan remnants and fan aprons on fan remnants ... R030XB148CA – Sandy Plain

2 Semi-active to stabilized upland sandsheets and dunes; in the absence of drought, altered hydrology or any other disturbance, dunes are stable enough to support creosote bush ... R030XD014CA – Hyperthermic Sandy Plains

3 Greater than 15 % slope ... R030XD008CA – Hyperthermic Sandhill

4 Semi-active to active upland dunes; in the absence of drought, altered hydrology or any other disturbance, dunes are too active to support creosote bush ... R030XD045CA – Hyperthermic Stable Sand Dunes And Sandsheets

5 This ecological site is found on stabilized dunes and steep sandsheets. Elevations range from 950 to 2620 feet, and slopes are 8 to 30 percent. The plant community is strongly dominated by big galleta, ... R030XD008CA – Hyperthermic Sandhill

6 This ecological site is found on stabilized sandsheets and dunes at elevations ranging from 710 to 2460 feet and slopes of 0 to 8 percent. Dominant soils are very deep fine sands that formed from eolian deposits and exhibit no soil development. ... R030XD025CA – Hyperthermic Sandsheets

B. Site occurs on an erosional fan remnant of the upper piedmont slope.

1 Site has lower elevation than 1650 feet. ... R030XB097NV – SANDHILL 3-5 P.Z.

III. [Criteria]

LRU 30-2 AZ

I. Bottom position, plant community receives additional moisture from run-on

A. Soil has loamy textures

1 Soil not gypsiferous ... R030XB231AZ – Loamy Wash 6-9" p.z.

2 Soil gypsiferous throughout the profile ... R030XB225AZ – Loamy Wash 6-9" p.z. Gypsic

3 Soils is saline and sodic ... R030XB229AZ – Loamy Swale 6-9" p.z. Sodic

B. Soil has sandy textures

2 No seasonal water table ... R030XB218AZ – Sandy Wash 6-9" p.z.

II. Upland position, plant community receives moisture only from precipitation

A. Slopes generally less than 15 percent

1 Soils are shallow ... R030XB214AZ – Limy Upland 6-9" p.z.

2 Soils are moderately deep or deeper

i. Soils calcareous throughout

a. Gypsum Crystals visible

1) Gypsum crystals sand and gravel sized ... R030XB213AZ – Gypsum Upland 6-9" p.z. Alkaline

2) Gypsum crystals small, difficult to discern ... R030XB224AZ – Gypsum Fan 6-9" p.z.

b. Gypsum crystals not visible

1) Soil skeletal ... R030XB206AZ – Cobbly Limy Upland 6-9" p.z. Deep

2) Soil non-skeletal ... R030XB211AZ – Limy Fan 6-9" p.z.

ii. Soils non-calcareous at surface

a. Soils calcareous in subsurface ... R030XB205AZ – Sandy Loam Upland 6-10" p.z. Limy Subsurface, Gravelly

b. Soils non-calcarous throughout

1) Soil texture clay loam, clay, cobbly clay loam ... R030XB227AZ – Clay Loam Upland 6-9" p.z.

2) Soil suface texture sandy loam to loam ... R030XB226AZ – Sandy Loam Upland 6-9" p.z. Fine

3) Soil surface fine sand, eolian ... R030XB221AZ – Sandy Upland 6-9" p.z.

B. Slopes generally greater than 15 percent

1 Soils moderately deep or deeper

i. Basalt cobble soil cover ... R030XB203AZ – Basalt Slopes 6-9" p.z.

ii. Subsurface also very cobbly and gravelly sandy loam to clay loam ... R030XB204AZ – Breaks 6-9" p.z.

iii. Soils not skeletal ... R030XB212AZ – Limy Slopes 6-9" p.z.

2 Soils very shallow, shallow

i. Slopes less than 65%

a. Soils over hard gypsum

1) Soils moderately alkaline ... R030XB222AZ – Gypsum Hills 6-9" p.z. Alkaline

2) Soils non-alkaline ... R030XB208AZ – Gypsum Hills 6-9" p.z.

b. Soil over rock parent material

1) Soils over igneous or metamorphic parent material

a) Soil very shallow to andesite bedrock ... R030XB201AZ – Andesite Hills 6-9" p.z. Coarse

b) Soil shallow to basalt bedrock ... R030XB202AZ – Basalt Hills 6-9" p.z.

c) Soil very shallow to shallow to hard granite or gneiss bedrock ... R030XB207AZ – Granitic Hills 6-9" p.z.

2) Soils over sedimentary parent material ... R030XB210AZ – Limestone Hills 6-9" p.z.

ii. Slopes abrupt, greater than 65%

a. Basalt cobbles and stones cover Moenkopi formation mudstones. Usually occurs as an escarpment, but may be in hill form. Soil is shallow to very deep ... R030XB203AZ – Basalt Slopes 6-9" p.z.

b. Soil very shallow to andesite bedrock. Slope range 20 to 70 percent ... R030XB220AZ – Andesite Hills 6-9" p.z.

LRU 30-3 AZ

I. Bottom position, plant community receives additional moisture from run-on

A. Soil texture range from sand to gravelly sandy loam, seasonal water table ... R030XC317AZ – Sandy Bottom 10-13" p.z.

B. Soil texture range from sand to gravelly sandy loam, no evidence of seasonal water table ... R030XC322AZ – Sandy Wash 10-13" p.z.

II. Upland position, plant community receives moisture only from precipitation

A. Slopes generally less than 15 percent

1 Soils Shallow or Very Shallow

i. Soil calcareous, over lime cemented hardpan ... R030XC311AZ – Limy Upland 10-13" p.z.

ii. Soil calcareous, over bedrock without cemented hardpan ... R030XC324AZ – Shallow Upland 10-13" p.z.

2 Soils Moderately Deep or Deeper

i. Soil calcareous

a. Soil skeletal

1) Soil texture ranges from sandy loam to clay ... R030XC318AZ – Sandy Loam Upland 10-13"

p.z. Limy, Skeletal

2) Soil texture loam to gravelly loam ... R030XC313AZ – Limy Upland 10-13" p.z. Deep

b. Soil non-skeletal ... R030XC308AZ – Limy Fan 10-13" p.z.

ii. Soil non-calcareous

a. Soil texture ranges from sandy clay to cobbly clay loam ... R030XC334AZ – Clay Loam Upland 10-13" p.z.

b. Soil texture ranges from gravelly sandy loam to gravelly loamy sand ... R030XC305AZ – Coarse Sandy Loam 10-13" p.z.

c. Soil texture ranges from sandy loam to gravelly loamy sand, and/or fine sandy loam ... R030XC321AZ – Sandy Loam Upland 10-13" p.z. Fine

d. Soil texture gravelly loamy sand to gravelly loamy sand ... R030XC315AZ – Sandy Loam Upland 10-13" p.z. Fine, Gravelly

B. Slopes generally greater than 15 percent

1 Soils very shallow to shallow

v. Slopes rising gradually from uplands, range 15-65 percent

a. Soil shallow to basalt bedrock ... R030XC333AZ – Basalt Hills 10-13" p.z. Limy

b. Soil very shallow or shallow to granite bedrock ... R030XC306AZ – Granitic Hills 10-13" p.z. Alkaline

c. Soil skeletal, shallow to granite bedrock ... R030XC307AZ – Limestone Hills 10-13" p.z.

d. Soil calcareous sandy loam from mixed sources ... R030XC327AZ – Sandy Loam Hills 10-13" p.z. Limy, Shallow

vi. Slopes rise abruptly to nearly vertical, over 65% ... R030XC381AZ – Limestone/Sandstone Cliffs 13-17" p.z.

2 Soils Moderately Deep or Deeper ... R030XC331AZ – Sandy Loam Slopes 10-13" p.z. Limy, Skeletal