USDA icon **Natural Resources Conservation Service**

Major Land Resource Area 046X
Northern and Central Rocky Mountain Foothills

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Ecological site keys

Key to LRUs

I. Site is located in Montana

A. Ecological Site is a forested site, including the aspen bottomlands within other LRUs.

B. Ecological site is located in central Montana. It borders the Little Belt Mountains, Highwood Mountains, Snowy Mountains (Big and Little), Crazy Mountains, or Castle Mountains, or may be in the foothills of the island mountain groups of the Bear's Paw and Little Rocky Mountains.

C. Not located in central Montana as described.

1 Ecological site lays south of the central LRU as described.

2 Ecological site lays north of the central LRU as described.

II. Site is located in Wyoming

A. Located in the Foothills of the Wyoming and Salt Ranges - or Wyoming Front LRU

1 Site does not receive any additional water. Soils are not saline or saline-sodic, moderately deep, deep, with less than 3% stone (10-25") and boulder (>25") cover; not skeletal within 20" of soil surface; not violently effervescent in the top 15" of mineral soil; textures range from very fine sandy loam to clay loam; Slope is < 30%; Clay content is ? 32% in surface mineral 6"; Site does not have an argillic horizon. ... R046XH122WY – Loamy Wyoming Front

2 Site does not receive any additional water. Soils are not saline or saline-sodic; are moderately deep, deep, with < 3% stone (10-25") and boulder (>25") cover. not skeletal within 20" of soil surface; Surface textures usually range from very fine sandy loam to clay loam in surface mineral 4" over a heavy argillic subsurface layer (clay loam or clay) with > 35% clay. Slope is < 30%. ...

R046XH124WY – Loamy Argillic Wyoming Front

3 Site not as the above two requirements - Sites are in development. Range Sites for MLRA 32 10-14 E, MLRA 43B 15-19W or 43B 15-19E

B. Not located in the Wyoming and Salt Ranges or Wyoming Front LRU - Sites are in development. Refer to historic Range Sites for MLRA 32 10-14 E, MLRA 43B 15-19W or 43B 15-19E

MLRA 46 LRU C

I. Site receives additional effective moisture

A. Soil saline (EC> 4 within surface 4")

1 Seasonal high water table > 40" from ground surface; salt tolerant plants dominate site ... R046XC597MT – Saline Lowland (SL) RRU 46-C 15-19 PZ

B. Site not Saline

1 Seasonal high water table > 40” from ground surface; site regularly receives more than normal soil moisture because of run-in or stream overflow ... R046XC504MT – Overflow (Ov) RRU 46-C 13-19 PZ

2 Water table less than 40 inches below soil surface

i. Site located within the riparian zone with seasonal high water table 24” to 40” ... R046XC520MT – Riparian Subirrigated (RSb) RRU 46-C 13-19 PZ

ii. Site not located within riparian zone

a. Seasonal high water table < 12” ... R046XC518MT – Wet Meadow (WM) RRU 46-C 15-19 PZ

b. Seasonal high water table 24” to 40” ... R046XC512MT – Subirrigated (Sb) RRU 46-C 13-19 PZ

II. Site does not receive additional effective moisture

A. Soil saline or saline-sodic within surface 20” or soils with natric or relic natric horizons.

1 No columnar structure; site dominated by salt tolerant plants ... R046XC603MT – Saline Upland (SU) RRU 46-C 15-19 PZ

2 Columnar structure present, abrupt root or water restrictive clay layer present within 8” of soil surface

i. Less than 4” of surface over clay layer (evidenced by columnar structure) ... R046XC602MT – Dense Clay (DC) RRU 46-C 15-19 PZ

ii. Soil has 4 to 8” of surface over clay layer (evidenced by columnar structure) ... R046XC609MT – Claypan (Cp) RRU 46-C 15-19 PZ

B. Site not Saline

1 Soils are very shallow or shallow

i. Soil very shallow (< 10” deep to bedrock, lithic, or paralithic root restrictive layer) ... R046XC517MT – Very Shallow (VSw) RRU 46-C 13-19 PZ

ii. Soil shallow (10” – 20” deep to bedrock, lithic, or paralithic root restrictive layer)

a. Soil texture within surface mineral 4” is typified by loam, clay loam, or silt loam ... R046XC506MT – Shallow (Sw) RRU 46-C 13-19 PZ

b. Clay content > 32% in surface mineral 4” (ribbon length > 2” long) ... R046XC598MT – Shallow Clay (SwC) RRU 46-C 13-19 PZ

2 Soils moderately deep, deep, or very deep (? 20” deep to bedrock, lithic, or paralithic root restrictive layer)

i. Soil skeletal to within 20” of soil surface (averages > 35% rock fragments in the 10”-20” layer)

c. Strongly or violently effervescent within top 4”, lime concentration increasing with depth. (typically limestone parent material) ... R046XC519MT – Limy Droughty (LyDr) RRU 46-C 13-19 PZ

f. Soil not strongly or violently effervescent in surface mineral 4” Sandy-skeletal within 20” of soil surface

1) Sandy-skeletal within 10” of soil surface ... R046XC514MT – Gravelly (Gr) RRU 46-C 13-19 PZ

2) Sandy-skeletal within 10-20” of soil surface & typically consists of gravels and/or cobbles ... R046XC507MT – Shallow to Gravel (SwGr) RRU 46-C 13-19 PZ

ii. Soil not skeletal within 20” of soil surface (averages < 35% rock fragments in the 10”-20” layer)

a. Strongly or violently effervescent in surface mineral 4”, lime concentration increasing with depth. (typically limestone parent material) ... R046XC510MT – Limy (Ly) RRU 46-C 13-19 PZ

b. Not strongly or violently effervescent in surface mineral 4”

1) Stones and/or boulders cover 3-15% surface area (15-30% cover measured by step transect) ... R046XC511MT – Stony (St) RRU 46-C 13-19 PZ

2) Stones and/or boulders cover ?3-15% surface area

a) Slope <15%

(1) Clay content is < 32% in surface mineral 4”. If present, argillic horizon has less than 35% clay content ... R046XC508MT – Silty (Si) RRU 46-C 13-19 PZ

(2) Coarse sandy loam to fine sandy loam texture within surface mineral 4”. ... R046XC505MT – Sandy (Sy) RRU 46-C 13-19 PZ

b) Slope ?15%

(1) Mollic epipedon present. Clay content is < 32% (ribbon < 2” long) in surface mineral 4”. ... R046XC516MT – Silty Steep (SiStp) RRU 46-C 13-19 PZ

(2) Mollic epipedon present. ... R046XC599MT – Thin Breaks (TB) RRU 46-C 13-19 PZ

MLRA 46 LRU 01

I. Site receives additional effective moisture

A. Soil saline (EC> 4 within surface 4”)

1 Seasonal high water table > 40” from ground surface; salt tolerant plants dominate site ... R046XN230MT – Saline Lowland (SL) RRU 46-N 13-19 PZ

B. Site NOT Saline

1 Seasonal high water table > 40” from ground surface; site regularly receives more than normal soil moisture because of run-in or stream overflow ... R046XN248MT – Overflow (Ov) RRU 46-N 13-19 PZ

2 Seasonal high water table within 40 inches

ii. Site has seasonal high water table from 12 to 24 inches below soil surface. ... R046XN256MT – Subirrigated (Sb) RRU 46-N 13-19 PZ

i. Site has seasonal high water table 24 to 40 inches below soil surface ... R046XN262MT – Wet Meadow (WM) RRU 46-N 15-19 PZ

II. Site does not receive additional effective moisture

A. Soil saline or saline-sodic within surface 20” or soils with natric or relic natric horizons

1 No columnar structure; site dominated by salt tolerant plants ... R046XN629MT – Saline Upland (SU) RRU 46-N 10-14 PZ

2 Columnar structure present, abrupt root or water restrictive clay layer present within 8" of soil surface

iii. Less than 4" of surface over clay layer (evidenced by columnar structure) ... R046XN630MT – Dense Clay (DC) RRU 46-N 10-14 PZ

ii. Soil has 4 to 8" of surface over clay layer (evidenced by columnar structure)

a. Site located in 15-19 inch precipitation zone located in the Northwestern portion of the LRU ... R046XN608MT – Claypan (Cp) RRU 46-N 15-19 PZ

b. Site located in the 13-19 inch precipitation zone located in the central portion of the LRU. ... R046XN628MT – Claypan (Cp) RRU 46-N 13-19 PZ

B. Site not as above

1 Soils are very shallow or shallow

i. Soil very shallow (< 10" deep to bedrock, lithic, or paralithic root restrictive layer) ... R046XN261MT – Very Shallow (VSw) RRU 46-N 15-19 PZ

ii. Soil shallow (10" – 20" deep to bedrock, lithic, or paralithic root restrictive layer)

a. Soil texture within surface mineral 4" is typified by loam, clay loam, or silt loam ... R046XN250MT – Shallow (Sw) RRU 46-N 13-19 PZ

b. Clay content > 32% in surface mineral 4" (ribbon length > 2" long) ... R046XN589MT – Shallow Clay (SwC) RRU 46-N 13-16 PZ

2 Soils moderately deep, deep, or very deep (? 20" deep to bedrock, lithic, or paralithic root restrictive layer)

i. Strongly or violently effervescent in surface mineral 4", lime concentration increasing with depth. (typically limestone parent material) ... R046XN254MT – Limy (Ly) RRU 46-N 13-17 PZ

ii. Not strongly or violently effervescent in surface mineral 4"

a. Site sandy skeletal within 10 inches of soil surface ... R046XN601MT – Gravelly (Gr) RRU 46-N 13-19 PZ

b. Site Not Sandy Skeletal

1) Site <15 percent slope

a) Coarse sandy loam to fine sandy loam texture within surface mineral 4" ... R046XN249MT – Sandy (Sy) RRU 46-N 13-19 PZ

b) Site not sandy

(1) Soil clay content >32% but less than 45% in the surface mineral 4 inches ... R046XN247MT – Clayey (Cy) RRU 46-N 13-19 PZ

(2) Clay content less than 32% in the mineral surface 4 inches

(a) Stones and/or Boulders cover 3-15% surface area (15-30% cover measured by step transect) ... R046XN255MT – Stony (St) RRU 46-N 13-19 PZ

(b) Site less than 32 percent clay in surface mineral 4 inches and argillic horizon, if present, less than 35% clay. ... EX046X01B032 – Loamy 15-19" PZ Frigid Rocky Mountain Front

Foothills

2) Site ? 15 percent slope

b) Site >15 percent slope. Site has mollic epipedon with clay content is < 32% (ribbon < 2” long) in surface mineral 4” **...** EX046X01B040 – Loamy Steep 15-19" PZ Frigid Rocky Mountain Front Foothills

a) Mollic epipedon not present. Site has coarse sandy loam to fine sandy loam texture. **...** R046XN264MT – Thin Breaks (TB) RRU 46-N 13-19 PZ

MLRA 46 LRU S

I. Site receives additional effective moisture

A. Seasonal high water table > 40” from ground surface; site regularly receives more than normal soil moisture because of run-in or stream overflow **...** R046XS109MT – Overflow (Ov) RRU 46-S 13-19 PZ

E. Water table less than 40 inches below soil surface

1 Site located in flood plain. Seasonal high water table 24” to 40” **...** R046XS118MT – Riparian Subirrigated (RSb) RRU 46-S 13-19 PZ

2 Site not located in flood plain

i. Seasonal water table < 12” **...** R046XS107MT – Wet Meadow (WM) RRU 46-S 15-19 PZ

ii. Seasonal high water table 24” to 40” **...** R046XS108MT – Subirrigated (Sb) RRU 46-S 15-19 PZ

II. Site does not receive additional effective moisture

A. Soils are very shallow or shallow

1 Soil very shallow (< 10” deep to bedrock, lithic, or paralithic root restrictive layer) **...** R046XS115MT – Very Shallow (VSw) RRU 46-S 13-19 PZ

2 Soil shallow (10” – 20” deep to bedrock, lithic, or paralithic root restrictive layer)

i. Soil texture within surface mineral 4” is typified by loam, clay loam, or silt loam . **...** R046XS114MT – Shallow (Sw) RRU 46-S 13-19 PZ

ii. Clay content > 32% in surface mineral 4” (ribbon length > 2” long) **...** R046XS619MT – Shallow Clay (SwC) RRU 46-S 13-16 PZ

B. Soils moderately deep, deep, or very deep (? 20” deep to bedrock, lithic, or paralithic root restrictive layer)

1 Soil skeletal to within 20” of soil surface (averages > 35% rock fragments in the 10”-20” layer)

iii. Soil loamy-skeletal or clayey-skeletal. Strongly or violently effervescent within top 4”, lime concentration increasing with depth. (typically limestone parent material) **...** R046XS117MT – Limy-Droughty (LyDr) RRU 46-S 13-19 PZ

iv. Site Sandy Skeletal with surface 20 inches

a. Sandy-skeletal within 10” of soil surface **...** R046XS116MT – Gravelly (Gr) RRU 46-S 13-19 PZ

b. Sandy-skeletal within 10-20” of soil surface & typically consists of gravels and/or cobbles. Not strongly or violently effervescent within surface mineral 4” ... R046XS113MT – Shallow to Gravel (SwGr) RRU 46-S 13-19 PZ

2 Soil not skeletal within 20” of soil surface (averages < 35% rock fragments in the 10”-20” layer)

i. Strongly or violently effervescent in surface mineral 4”, lime concentration increasing with depth. (typically limestone parent material) ... R046XS144MT – Limy (Ly) RRU 46-S 13-19 PZ

ii. Not strongly or violently effervescent in surface mineral 4”

c. Slope <15%

1) Coarse sandy loam to fine sandy loam texture within surface mineral 4” ... R046XS106MT – Sandy (Sy) RRU 46-S 15-19 PZ

2) Soil NOT coarse sandy loam to fine sandy loam texture

a) Clay content is > 32% in surface mineral 4” of mineral soil (ribbon > 2” long) ... R046XS105MT – Clayey (Cy) RRU 46-S 13-19 PZ

b) Clay content is < 32% in surface mineral 4”

(1) Stones and/or boulders cover 3-15% surface area (15-30% cover measured by step transect) ... R046XS142MT – Stony (St) RRU 46-S 13-19 PZ

(2) Clay content is < 32% in surface mineral 4”. Argillic horizon, if present, has < 35% clay of mineral soil (ribbon < 2” long) ... R046XS104MT – Silty (Si) RRU 46-S 13-19 PZ

d. Slope ?15%

1) Site without mollic epipedon. Soil textures variable of sedimentary origins ... R046XS119MT – Thin Breaks (TB) RRU 46-S 13-19 PZ

MLRA 46 PES GROUPINGS

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1 Site located in floodplain dominated by herbaceous vegetation and broadleaf trees and shrubs. ... R046XP801MT – Bottomland Group

2 Site potential of tree species with a canopy cover of 25% or greater

A Site potential dominated by Quaking aspen ... F046XP908MT – Upland Aspen Woodland Group

B Site potential coniferous forest

1a. Site receives additional soil moisture

i. Soil has a Cryic Soil Temperature Regime (less than 70 Frost Free Days) ... F046XP906MT – Subirrigated Cold Woodland Group

ii. Site under Frigid Soil Temperature Regime (greater than 70 Frost Free Days) ... F046XP907MT – Subirrigated Cool Woodland Group

1b. Site does not receive additional soil moisture and is generally located in an upland landscape position

2a. Soils shallow to very shallow (< 20” deep to bedrock, lithic, or paralithic root restrictive layer)

a. Site has Frigid, Warm Temperature Regime (90-120 Frost Free Days). Plant Community dominated by Ponderosa pine ... F046XP904MT – Shallow Warm Woodland Group

b. Site has Frigid Temperature Regime (70-100 Frost Free Days). Site dominated by a mixed coniferous forest primarily of Douglas fir with Ponderosa pine ... F046XP903MT – Shallow Cool Woodland Group

c. Site has Cryic Soil Temperature Regime (less than 70 Frost Free Days). Plant Community dominated by Douglas fir with Lodgepole pine ... F046XP902MT – Shallow Cold Woodland Group

2b. Soils moderately deep, deep, or very deep (? 20” deep to bedrock, lithic, or paralithic root restrictive layer)

3a. Soil is strongly or violently effervescent (calcareous) in surface mineral 4”, lime concentration increasing with depth. (typically limestone parent material)

1) Site has Frigid, Warm Temperature Regime (90-120 Frost Free Days). Plant Community dominated by Ponderosa pine ... F046XP913MT – Limy Warm Woodland Group

2) Site has Frigid Temperature Regime (70-100 Frost Free Days). Site dominated by a mixed coniferous forest primarily of Douglas fir with Ponderosa pine ... F046XP912MT – Limy Cool Woodland Group

3) Site has Cryic Soil Temperature Regime (less than 70 Frost Free Days). Plant Community dominated by Douglas fir with Lodgepole pine ... F046XP914MT – Limy Cold Woodland Group

3b. Site not influenced by soil chemistry within surface 10 inches

4a. Stones and/or boulders cover > 15% surface area (> 30% cover measured by step transect)

a) Site has Frigid Temperature Regime (70-100 Frost Free Days). Site dominated by a mixed thin forest primarily of Douglas fir and Aspen ... F046XP901MT – Rubbly Cool Woodland Group

b) Site has Cryic Soil Temperature Regime (less than 70 Frost Free Days). Plant Community dominated by thin forest of Douglas fir with Lodgepole pine and Alder ... F046XP915MT – Rubbly Cold Woodland Group

4b. Stones and/or boulders cover < 10% surface area

a) Site has Frigid, Warm Temperature Regime (90-120 Frost Free Days). Plant Community dominated by Ponderosa pine ... F046XP911MT – Upland Warm Woodland Group

b) Site has Frigid Temperature Regime (70-100 Frost Free Days). Site dominated by a mixed coniferous forest primarily of Douglas fir with Ponderosa pine ... F046XP910MT – Upland Cool Woodland Group

c) Site has Cryic Soil Temperature Regime (less than 70 Frost Free Days). Plant Community dominated by Douglas fir with Lodgepole pine ... F046XP909MT – Upland Cold Woodland Group

MLRA Montana-wide Key

I. Site receives additional effective moisture.

A. Soil Saline (EC>4 within surface 4") and water table greater than 40" from ground surface; salt tolerant plants dominate site -- Saline Overflow (SO)

B. Soil Not Saline

1 Seasonal high water table ? 40" from ground surface; site regularly receives more than normal soil moisture from run-in and stream overflow -- Overflow (Ov)

2 Seasonal high water table < 40" from ground surface

a. Site located in Floodplain

1) Seasonal high water table < 24"

a) Seasonal high water table <12" -- Riparian Wet Meadow (RWM)

b) Seasonal high water table 12" to 24" -- Riparian Meadow (RM)

2) Seasonal high water table 24" to 40" -- Riparian Subirrigated (RSb)

b. Site not located in Floodplain

1) Seasonal high water table < 24"

a) Seasonal high water table <12" -- Wet Meadow (WM)

b) Seasonal high water table 12" to 24" -- Meadow (M)

2) Seasonal high water table 24" to 40" -- Subirrigated (Sb)

II. Site does not receive additional effective moisture

A. Soil Saline or Saline-Sodic within surface 20" or soils with natric or relic natric horizons

1 No columnar structure; site dominated by salt tolerant plants -- Saline Upland (SU)

2 Columnar structure present, abrupt root or water restrictive clay layer present within 8" of soil surface

i. Less than 4" of soil surface over clay layer (evidence of columnar structure) -- Thin Claypan (TCp)

ii. Soil has 4" to 8" of surface over clay layer (evidence of columnar structure) -- Claypan (Cp)

B. Soil NOT Saline or Saline-Sodic

1 Soil Shallow (10"-20" deep to bedrock, lithic, or paralithic root restrictive layer)

i. Soil is strongly or violently effervescent (calcareous) in surface mineral 4"; lime concentrations often increase with depth

a. Soil skeletal (?35% rock fragment in the 10-20" layer) -- Shallow Limy Droughty (SwLyDr)

b. Soil NOT skeletal (<35% rock fragment in 10-20" layer) -- Shallow Limy (SwLy)

ii. Soil NOT strongly or violently effervescent in surface mineral 4"

a. Soil Skeletal (?35% rock fragments in 10-20" layer) -- Shallow Droughty (SwDr)

b. Soil NOT skeletal (<35% rock fragments in 10-20" layer)

1) Soil clay content ? 32% in surface mineral 4" (soil ribbon ? 2") -- Shallow Loamy (SwLo)

2) Soil clay content >32% in surface mineral 4" (ribbon >2")

2 Soils moderately deep, deep, or very deep (? 20" deep to bedrock, lithic, or paralithic root restrictive layer

i. Soil skeletal (?35% rock fragment in the 10-20" layer)

a. Soil Sandy-Skeletal

1) Soil sandy-skeletal within 10" of soil surface -- Gravelly (Gr)

2) Soil sandy-skeletal within 10-20" of soil surface

a) Soil strongly or violently effervescent within surface mineral 4" -- Shallow to Gravel, Limy (SwGrLy)

b) Soil NOT strongly or violently effervescent within surface mineral 4" -- Shallow to Gravel (SwGr)

b. Soil loamy-skeletal or clayey-skeletal

1) Soil strongly or violently effervescent within top 4" -- Limy Droughty (LyDr)

2) Soil NOT strongly or violently effervescent within surface mineral 4"

a) Slope < 15% -- Droughty (Dr)

b) Slope ? 15% -- Droughty Steep (DrStp)

ii. Soil NOT skeletal (<35% rock fragment in 10-20" layer)

a. **Soil strongly or violently effervescent in surface mineral 4" -- Limy (Ly)**

b. **Soil NOT strongly or violently effervescent in surface mineral 4"**

1) **Soil Sand or Loamy Sand texture within surface mineral 4" -- Sands (Sa)**

2) **Soil NOT sand or loamy sand texture**

a) **Slope < 15%**

(1) **Soil Coarse sandy loam to fine sandy loam texture within surface mineral 4" -- Sandy (Sy)**

(2) **Soil texture NOT sandy loam to fine sandy loam**

(a) **Soil Clay content >32% in surface mineral 4" (ribbon ? 2")**

(1) **Clay content >32%-45% within surface mineral 4" -- Clayey (Cy)**

(2) **Clay >45% within surface mineral 2" -- Dense Clay Nonsodic (DCX)**

(b) **Soil Clay content ?32% in surface mineral 4"**

(1) **Any Argillic horizon in surface 20" with >32% clay (ribbon ?2") -- Loamy Argillic (LoA)**

(2) **Argillic horizon, if present in surface 20", has ? 32% clay (ribbon <2") -- Loamy (Lo)**

b) **Slope ? 15%**

(1) **Mollic epipedon present**

(a) **Clay content is >32% in surface mineral 4" (ribbon ? 2") -- Clayey Steep (CyStp)**

(b) **Clay content is ? 32% in surface mineral 4" (ribbon < 2") -- Loamy Steep (LoStp)**

(2) **Mollic epipedon NOT present**

(a) **Coarse sandy loam to fine sandy loame texture -- Thin Sandy (TSy)**

(b) **Soils NOT sandy loam or fine sandy loam**

(1) **Clay content is ? 32% in surface mineral 4" (ribbon < 2") -- Thin Loamy (TLo)**

(2) **Clay content is >32% in surface mineral 4" (ribbon ? 2") -- Thin Clayey (TCy)**