

# Major Land Resource Area 043B

## Central Rocky Mountains

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### Ecological site keys

#### Key to the Keys

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I. Site of interest is in the southern extent of the MLRA, in the State of Wyoming

A. Searching for Ecological Site Groups - Forested Lands. ... Key 2 – WY 43B PES Groupings

B. Searching for ecological site descriptions (ESDs) - Rangelands generally.

1 Searching for New Provisional and Most Current ESDs Developed.

i. Site is in the foothills east of the Continental Divide.

a. Site is in the lower foothills, 10-14 inch precipitation Zone. ... Key 10 – MLRA 43B Wyoming East Divide Absaroka Lower Foothills Ecological Site Key

b. Site is in the upper foothills, 15-19 inch precipitation Zone.

1) Foothills are on the eastern foothills of the Bighorn Mountains. ... Key 14 – ARCHIVED: Ecological Site Key MLRA 43B Zone 13:15-19NP

2) Upper foothills of all other mountain ranges. ... Key 9 – MLRA 43B Wyoming East Divide Absaroka Upper Foothills Ecological Site Key

ii. Site is in the mountains East of the Continental Divide.

a. Site is in Alpine Zone of the Mountains ... Key 7 – MLRA 43B Wyoming East Divide Absaroka Alpine Zone Ecological Site Key

b. Site is in the 20 inch and greater precipitation zone of the Cryic or colder zone of the mountain, above the foothills, but below the alpine zone. ... Key 8 – MLRA 43B Wyoming East Divide Absaroka and Bighorn Subalpine Zone Ecological Site Key

2 Searching for Archived, established ESDs, pre-2010.

i. Searching for Foothills and Basins 10-14 inch Precipitation Zone, East of the Continental Divide. ... Key 15 – ARCHIVED: Key to Ecological Sites MLRA 32X Zone 7: 10-14 E

ii. Searching for Foothills and Mountains.

a. Site is in the High Mountains with 20 inches of precipitation or Greater. ... Key 11 – ARCHIVED: Key to Ecological Sites MLRA 43B Zone 1: 20+ M

b. 15 to 19 inches of precipitation.

1) West of the Continental Divide ... Key 12 – ARCHIVED: Key to Ecological Sites MLRA 43B Zone 2: 15-19 W

2) East of the Continental Divide.

a) Eastern flank of the Bighorn Mountains, Northern Plains Region of 43B. ... Key 14 – ARCHIVED: Ecological Site Key MLRA 43B Zone 13:15-19NP

b) All other East Divide Foothills. ... Key 13 – ARCHIVED: Key to Ecological Sites MLRA 43B Zone 6: 15-19 E

II. Site of interest is in the Northern extent of the MLRA, or in the State of Idaho and Montana.

A. Site of Interest is in Montana

1 Searching for Ecological Site Groups - Forested Lands. ... Key 16 – MT 43B PES GROUPINGS KEY

2 Provisional Rangeland Ecological Site Key for Montana extent of 43B ... Key 5 – MT - Northernmost area of MLRA extent

B. Site of interest is in Idaho

- 1 Searching for Ecological Site Groups - Forested Lands. ... Key 4 – ID 43B PES Groupings
- 2 Provisional Rangeland Ecological Site Key for Idaho extent of 43B ... Key 6 – Rangeland Key for 43B Idaho portion

## WY 43B PES Groupings

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Part I. Biotic Groupings - Forestland Groups

A. Shallow Depth Driven

- i. Higher Elevations ... F043BP702WY – Shallow Cool Woodland Group
- ii. Lower Elevations ... F043BP704WY – Shallow Warm Woodland Group

B. Position Driven

- i. Run-in Sites
  - i. Lowlands/bottomlands ... F043BP707WY – Subirrigated Cool Woodland Group
  - ii. Uplands ... F043BP708WY – Upland Aspen Woodland Group
- ii. Run-off Site
  - a. High elevation, North Slopes ... F043BP709WY – Upland Cold Woodland Group
  - b. Mid-elevations ... F043BP710WY – Upland Cool Woodland Group
  - c. Low Elevations, South Slopes ... F043BP711WY – Upland Warm Woodland Group

## MLRA 43B Montana PES Groupings Key

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Part I. Biotic Grouping

A. Rangeland Groupings

1 Shallow Soil Depth (less than 20" deep)

- i. Site Dominated by native grasses ... R043BP810MT – Shallow Grassland Group
- ii. Site Dominated by Sagebrush ... R043BP811MT – Shallow Sagebrush Shrubland Group
- iii. Site dominated by non-sagebrush shrubs ... R043BP812MT – Shallow Shrubland Group
- iv. Site located in alpine system ... R043BP823MT – Shallow Alpine Group

2 Position Driven

- i. Site does not receive additional moisture and is considered an upland site (run-off sites)
  - a. Site located in Alpine System
    - 1) Site not affected by soil chemistry ... R043BP821MT – Upland Alpine Group
    - 2) Site affected by soil chemistry ... R043BP822MT – Limy Alpine Group
  - b. Site not in Alpine System
    - 1) Site affected by soil chemistry
      - a) Site strong or violently effervescent within 4 inches of soil surface
        - (1) Site dominated by native grasses ... R043BP804MT – Limy Grassland Group
        - (2) Site dominated by sagebrush species ... R043BP805MT – Limy Sagebrush Shrubland Group
      - b) Site affected by salt (sodic or saline sites)
        - (1) Site dominated by native grasses ... R043BP807MT – Saline Sodic Grassland Group
        - (2) Site dominated by sagebrush species ... R043BP808MT – Saline Sodic Sagebrush

## Shrubland Group

### 2) Site not affected by soil chemistry

- a) Site dominated by native species ... R043BP818MT – Upland Grassland Group
- b) Site dominated by sagebrush species ... R043BP819MT – Upland Sagebrush Shrubland Group
- c) Site dominated by non-sagebrush shrubs ... R043BP820MT – Upland Shrubland Group

### ii. Site receives additional moisture from position in or near streams or waterways (run-in sites)

#### a. Site affected by soil chemistry

- 1) Site dominated by native grasses ... R043BP813MT – Subirrigated Saline-Sodic Grassland Group
- 2) Site dominated by native shrubs ... R043BP814MT – Subirrigated Saline-Sodic Shrubland Group

#### b. Site not affected by soil chemistry

- 1) Site located in Alpine System ... R043BP824MT – Subirrigated Alpine Group
- 2) Site not located in Alpine System
  - a) Site dominated by native grasses ... R043BP815MT – Subirrigated Grassland Group
  - b) Site dominated by sagebrush species ... R043BP816MT – Subirrigated Sagebrush Shrubland Group
  - c) Site dominated by non-sagebrush shrub species ... R043BP817MT – Subirrigated Shrubland Group
  - d) Site has a mix of native deciduous trees, shrubs, and grasses that is nearing forest levels of canopy cover ... R043BP801MT – Bottomland Group

## B. Forestland Groupings

### 1 Shallow Depth Driven

- i. Site at High elevation and North slopes ... F043BP902MT – Shallow Cold Woodland Group
- ii. Site at Mid-elevations ... F043BP903MT – Shallow Cool Woodland Group
- iii. Site at Low elevations and South facing Mid-elevation ... F043BP904MT – Shallow Warm Woodland Group

### 2 Position Driven

#### i. Site receives additional moisture from position in or near streams or waterways (run-in sites)

- a. Site located at high elevation ... F043BP906MT – Subirrigated Cold Woodland Group
- b. Site located at Mid-elevations
  - 1) Site has permanent water table with 20 inches of surface ... F043BP917MT – Subirrigated Cool Moist Woodland Group
  - 2) Site has permanent water table within 20 to 40 inches of surface ... F043BP907MT – Subirrigated Cool Woodland Group

#### ii. Site does not receive additional moisture from position in or near streams or waterways (run-in sites)

##### a. Site affected by soil chemistry

- 1) Site located at Mid-elevation ... F043BP912MT – Limy Cool Woodland Group
- 2) Site located at Low elevations ... F043BP913MT – Limy Warm Woodland Group

##### b. Site not affected by soil chemistry

- 1) Site affected site modifiers (texture or surface cover)
  - a) Site Ashy or Medial textural class ... F043BP916MT – Ashy Cold Woodland Group
  - b) Site has greater than 15 percent stone or boulder cover or fragmental textural family ... F043BP901MT – Rubbly Cool Woodland Group
- 2) Site without textural or surface modifiers
  - a) Site dominated by Aspen ... F043BP908MT – Upland Aspen Woodland Group

- b) Site located at High elevations ... F043BP909MT – Upland Cold Woodland Group
- c) Site located at Mid-elevation ... F043BP910MT – Upland Cool Woodland Group
- d) Site located at Low elevations ... F043BP911MT – Upland Warm Woodland Group

## **ID 43B PES Groupings**

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### **Part I. Biotic Groupings**

#### **Rangeland Groups**

- i. Alpine ... R043BP501ID – Alpine Group

#### **Forestland Groups**

##### **i. Chemistry/Parent Material Driven**

- i. Ash Deposits ... F043BP616ID – Ashy Cold Woodland Group
- ii. Lime driven ... F043BP612ID – Limy Cold Woodland Group

##### **ii. Shallow Depth Driven**

- i. Higher Elevations ... F043BP602ID – Shallow Cool Woodland Group
- ii. Lower Elevations ... F043BP604ID – Shallow Warm Woodland Group

##### **iii. Position Driven**

- i. Run-in Sites ... F043BP607ID – Subirrigated Cool Woodland Group
- ii. Run-off Site
  - a. High elevation, North Slopes ... F043BP609ID – Upland Cold Woodland Group
  - b. Mid-elevations ... F043BP610ID – Upland Cool Woodland Group
  - c. Low Elevations, South Slopes ... F043BP611ID – Upland, Warm Woodland Group

## **MT - Northernmost area of MLRA extent**

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- I. Site receives subirrigated water influence. ... EX043B15Z955 – Montane Subirrigated Meadow Cryic Northern Rocky Mountain Front
- II. Site is in the uplands.
  - A. Site is forested ... EX043B15I953 – Montane Deciduous Clayey Outwash Terrace 20-24" PZ Cryic Northern Rocky Mountain Front
  - B. Site is not forested
    - 1 Site is in the subalpine zone ... EX043B15J952 – Subalpine Windswept Shallow Meadow 25-30" PZ Cryic Northern Rocky Mountain Front
    - 2 Site is in the montane zone ... EX043B15I954 – Montane Very Deep Meadow 20-24" PZ Cryic Northern Rocky Mountain Front

## **Rangeland Key for 43B Idaho portion**

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### **I. Site occurs on uplands**

#### **A. Soils derived from granite parent material.**

- 1 Site has slopes less than 30%. Site occurs in 16-22 PZ and elevations of 6000 to 7500 ft. Occasional rock outcrops may occur through-out the site. Soil are deep with surface texture is sandy loam with some rock

fragments ... R043BY013ID – South Slope Loamy 16-22 PZ ARTRV/FEID

2 Site has slopes greater than 30%.

i. Site occurs on southerly aspects.

a. Soils at site are stony or gravelly.

1) Site occurs in 22 inch PZ and elevations of 2800 to 5300 ft. Soils are moderately deep loams. They are derived from basalt. Coarse fragments below 10 inches ranges from 40-80 percent. ...

R043BY018ID – South Slope Stony 22+ PZ PSSP6-FEID ... R043BY018ID – South Slope Stony 22+ PZ PSSP6-FEID

2) Site occurs in 16-22 PZ and elevations of 6500 to 10000 ft. Soils are moderately deep gravelly loams ... R043BY020ID – South Slope Gravelly 16-22 PZ ARTRV/BRMA4-ELTRT ...

R043BY020ID – South Slope Gravelly 16-22 PZ ARTRV/BRMA4-ELTRT

b. Soils are loamy or medium textured: Site occurs in 16-22 PZ and elevations of 6000 to 7500 ft. Occasional rock outcrops may occur through-out the site. Soil are deep with surface texture is sandy loam with some rock fragments ... R043BY013ID – South Slope Loamy 16-22 PZ ARTRV/FEID

ii. Site occurs on northerly aspects: Site occurs in 16-22 PZ and elevations of 5500 to 10000 ft. Soils are deep, well drained silt loams and loams. ... R043BY019ID – North Slope Loamy 16-22 PZ SYORU/FEID-PSSPS

B. Soils not derived from granite soils.

1 Soils are not associated with glacial moraines or glacial landforms.

i. Soils are shallow.

a. Site occurs in 16-22 inch precipitation zone.

1) Elevations of 4500 to 6000 ft. They occur on ridgetops and mountainsides. Soils are shallow to fractured bed-rock. Soil textures are very cobbly loam to cobbly clay loams formed in residuum of basalt. ... R043BY004ID – Shallow Fractured Stony Loam 16-22 PZ ARTRV/FEID

2) Site occurs in 16-22 inch PZ and elevations of 6300 to 7500 ft. The site occurs on nearly level to gently sloping outwash fans. Soils are shallow to sand and gravels that are more than 60 percent by volume. Surface in gravelly sandy loams ... R043BY016ID – Shallow Gravelly 16-22 PZ ARAR8/FEID

b. Site occurs in 22+ precipitation zone Elevations of 6300 to 7500 ft. The site occurs on nearly level to gently sloping outwash fans. Soils are shallow to sand and gravels that are more than 60 percent by volume. Surface in gravelly sandy loams ... R043BY016ID – Shallow Gravelly 16-22 PZ ARAR8/FEID

ii. Soils are moderately deep to deep.

a. Sites occur primarily on side slopes and benches.

1) Elevations of 6800 to 10000 ft. It occurs on side slopes and benches. Soils are loams. ... R043BY021ID – Mountain Loamy 22+ PZ FEID/POGR9-GEVI2

2) Site occurs at elevations of 6800 to 10000 ft. It occurs on side slopes, benches and mountain slopes. Soils are loams and sub-soils are gravelly loams. ... R043BY024ID – Subalpine Loamy 22+ PZ BRMA4/POGR9-GEVI2

b. Sites occur on ridgetops or mountain sides with shallow fractured bedrock.

1) Elevations of 4500 to 6000 ft. They occur on ridgetops and mountainsides. Soils are shallow to fractured bed-rock. Soil textures are very cobbly loam to cobbly clay loams formed in residuum of basalt. ... R043BY003ID – Loamy 22+ PZ FEID-PSSPS

2) Site occurs at elevations of 7000 - 10000 ft. They occur on or near mountain Ridgetops and divides that are exposed to the Wind. Soils are moderately deep to deep loams ... R043BY022ID – Windswept Mountain Ridge 22+ PZ FEID-CAREX

2 Site occurs on rolling glacial moraines, fans and fan terraces. Site occurs in 16-22 PZ and elevations of 6000 to 7300 ft. Soils are loams and can have some rocks on the surface ... R043BY009ID – Loamy 16-22 PZ ARTRV/FEID

II. Site occurs on bottomlands or riparian areas (slopes less than 5%)

A. The site is associated with water coarses: Site occurs in 16 to over 22-inch PZ and at elevations of 6000 to

10000 ft. Soils have little development. Soils are mixed gravelly and sandy alluvium with coarse fragments. Water tables are near the surface to 12 inches. ... R043BY011ID – Riparian SALIX/CAREX

B. Site is not strictly associated with water courses.

1 Soils on the site have an organic mat 8-40 inches.

i. Soils on the site have an organic mat (peat) 10-40 inches thick. Soils are saturated to the surface yearlong ... R043BY023ID – Fen 22+ PZ Carex

ii. Organic mat present that is 8-40 inches Water at or up to 6 inches above the surface at the beginning of the growing season and down to less than 10 inches at the end of the growing season. ... R043BY014ID – Wet Meadow (Muck) SALIX/CAREX

2 Site has less than 8" of organic layer and a water table present.

i. Site has a permanent water table between 1 and 3 ft. ... R043BY012ID – Mountain Poorly Drained Bottom ARCAV3-DAFRF/FEID

ii. Water at or near the surface at beginning of the growing season and greater than 40 inches at the end of the growing season. ...

a. Water at or near the surface at beginning of growing season and down to 20-40 inches at the end of the growing season. ... R043BY007ID – Meadow DECA18-CANE2

b. Water at or near the surface at beginning of the growing season and greater than 40 inches at the end of the growing season. ... R043BY008ID – Dry Meadow PONE3-PHAL2

## **MLRA 43B Wyoming East Divide Absaroka Alpine Zone Ecological Site Key**

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I. Site receives additional effective moisture<sup>1</sup> – If no, refer to Group II

A. Sites with a water table present for at least part of the growing season, site dominated by hydrophilic plants

1 Site has water above soil surface part of the growing season, and a water table present within 0-12" (0-30 cm) annually ... EX043B23D178 – Wetland (WL) Absaroka Alpine Zone

2 Site has a seasonal water table

i. Seasonal water and receives higher than normal soil moisture because of stream overflow or subsurface seep occurring within the channel system of an intermittent or perennial stream channels ... EX043B23D182 – Riparian Lowlands (RLL) Absaroka Alpine Zone

ii. Seasonal water table from snowmelt or seeps, site regularly receives higher than normal soil moisture because of run-in, occurs upslope from riparian systems ... EX043B23D180 – Wet Meadows (WM) Absaroka Alpine Zone

B. Site receives periodic overflow from adjacent slopes, but without a water table within 78" (200 cm)

1 Soil has ≥ 35% clay in the upper 8" (20 cm) of the mineral soil surface ... EX043B23D106 – Clayey Overflow (CyO) Absaroka Alpine Zone

2 Soil has < 35% clay in the upper 8" (20 cm) of the mineral soil surface ... EX043B23D130 – Overflow (Ov) Absaroka Alpine Zone

II. Site does not receive additional effective moisture<sup>1</sup>

A. Soil is very shallow (< 10" (25 cm) or shallow (< 20" (50 cm) to bedrock (lithic or paralithic contact)

1 Soils very shallow, includes areas of exposed bedrock and may include pockets of deep soil, often on steep (up to 55%) slopes with very low productivity potential

i. Soil with igneous or volcanic bedrock ... EX043B23D116 – Igneous (Ig) Absaroka Alpine Zone

ii. Soil with sedimentary bedrock, common on windswept ridges, (if productivity is high and > 35% rock fragments are present use Gravelly (Gr)) ... EX043B23D176 – Very Shallow (VS) Absaroka Alpine Zone

2 Soils shallow, productivity potential is LOW

i. Soil derived from igneous parent material (igneous or volcanic bedrock) ... EX043B23D160 – Shallow Igneous (SwIg) Absaroka Alpine Zone

- ii. Soil derived from sedimentary parent material (i.e. sandstone or shale bedrock) ... EX043B23D157 – Shallow Sedimentary (SwS) Absaroka Alpine Zone

B. Soils moderately deep to very deep (> 20" (50 cm) to bedrock (lithic or paralithic contact)

1 Soil is skeletal (> 35% rock fragments<sup>7</sup>) in the upper 20" (50 cm) of the mineral soil surface

- i. Soil is skeletal within the upper 8" (20 cm) of the mineral soil surface
  - a. Soil has < 18% clay; surface fragments and fragments in the soil profile are dominantly < 3" (76mm) in diameter, but may range in size ... EX043B23D112 – Gravelly (Gr) Absaroka Alpine Zone
  - b. Soil has ≥ 18% but < 60% clay; surface fragments and fragments in the soil profile are dominantly ≥ 3" (76mm) in diameter but < 10" (250 mm), but may range in size ... EX043B23D175 – Skeletal (Sk) Absaroka Alpine Zone
- ii. Soil is skeletal starting within the upper 8-20" (20-50 cm) from the mineral soil surface; Soil has ≥ 18% but < 60% clay through the upper 20" (50 cm) of the mineral soil surface
  - a. Fragments typically consisting of stones and boulders (fragments > 10" (250 mm) in diameter), surface fragments (3-15%) increase in stones and boulders, common on Glacial outwash
    - 1) Slope > 20% ... EX043B23D170 – Steep Stony Upland (SStU) Absaroka Alpine Zone
    - 2) Slope ≤ 20% ... EX043B23D172 – Stony Upland (StU) Absaroka Alpine Zone
  - b. Fragments typically consisting of cobbles (fragments are dominantly > 3" (76 mm) but < 10" (250 mm) in diameter); a few stones and boulders (0-3%) are present, common on landslides ... EX043B23D109 – Cobbly Upland (CoU) Absaroka Alpine Zone

2 Soil is not skeletal in the upper 20" (50 cm) of the mineral soil surface

- i. Soil has ≥ 35% clay starting within the upper 4" (10 cm) from the mineral soil surface
  - a. Abrupt clay increase<sup>6</sup> to > 40% clay present within 4-8" (10-20 cm) of the mineral soil surface, significant surface cracking ... EX043B23D110 – Dense Clay (DC) Absaroka Alpine Zone
  - b. Soil has ≥ 35% clay throughout the upper 20" (10 cm) of mineral soil ... EX043B23D104 – Clayey (Cy) Absaroka Alpine Zone
- ii. Site not as above
  - a. Soil has < 18% clay starting within the upper 4" (10 cm) and continues throughout the upper 20" (50 cm) of mineral soil ... EX043B23D150 – Sandy (Sy) Absaroka Alpine Zone
  - b. Soil has ≥ 18% but < 35% clay in the upper 20" (50 cm) of the mineral soil surface
    - 1) Soils derived from granitic parent material (currently specific to Bighorn Mtns) ... EX043B23D113 – Granitic Loamy (GLy) Absaroka Alpine Zone
    - 2) Soil derived from sedimentary parent material (i.e. sandstone or shale bedrock)
      - a) Slope > 20%, may have indications of terrecettes ... EX043B23D168 – Steep Loamy (SLy) Absaroka Alpine Zone
      - b) Slope ≤ 20% ... EX043B23D122 – Loamy (Ly) Absaroka Alpine Zone

1. For areas that receive additional moisture through snow trapping, consider adjusting to a wetter LRU consistent with the vegetation observed for the site keyed. It is anticipated that most snow-trap sites will not have a water table.

2. Specific plant species listed in the key are not to be used as the only determining factor. Management or disturbance may have removed or altered the plant composition that could reflect the wrong ecological site.

6. The dense clay site will have a lighter textured cap or "A" horizon with an abrupt clay increase, commonly the clay percent will then decrease as move lower in the profile. The abrupt increase in the upper portion of the profile with significant cracking is the key for this site. Clayey may have a lighter textured cap but typically maintains or increases in clay as move through the profile.

7. When calculating percent rock fragments in the profile to determine if a site is skeletal, pararock fragments (parachanners) are not considered, however, channers are. The difference between a parachanner and a channer is how "hard" the rock is. Soft flat fragments (ruptured by hand) are parachanners, while harder flat fragments are channers.

## MLRA 43B Wyoming East Divide Absaroka and Bighorn Subalpine Zone Ecological Site Key

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### I. Site receives additional effective moisture<sup>1</sup> – If no, refer to Group II

- A. Sites with a water table present for at least part of the growing season, site dominated by hydrophilic plants
  - 1 Site has water above soil surface part of the growing season, and a water table present within 0-12" (0-30 cm) annually ... EX043B23C178 – Wetland (WL) Absaroka Subalpine Zone
  - 2 Site has a seasonal water table
    - i. Seasonal water and receives higher than normal soil moisture because of stream overflow or subsurface seep occurring within the channel system of an intermittent or perennial stream channels ... EX043B23C182 – Riparian Lowlands (RLL) Absaroka Subalpine Zone
    - ii. Seasonal water table from snowmelt or seeps, site regularly receives higher than normal soil moisture because of run-in, occurs upslope from riparian systems ... EX043B23C180 – Wet Meadows (WM) Absaroka Subalpine Zone
- B. Site receives periodic overflow from adjacent slopes, but without a water table within 78" (200 cm)
  - 1 Soil has  $\geq 35\%$  clay in the upper 8" (20 cm) of the mineral soil surface ... EX043B23C106 – Clayey Overflow (CyO) Absaroka Subalpine Zone
  - 2 Soil has  $< 35\%$  clay in the upper 8" (20 cm) of the mineral soil surface ... EX043B23C130 – Overflow (Ov) Absaroka Subalpine Zone

### II. Site does not receive additional effective moisture<sup>1</sup>

- A. Soil is very shallow ( $< 10"$  (25 cm) or shallow ( $< 20"$  (50 cm) to bedrock (lithic or paralithic contact)
  - 1 Soils very shallow, includes areas of exposed bedrock and may include pockets of deep soil, often on steep (up to 55%) slopes with very low productivity potential
    - i. Soil with igneous or volcanic bedrock ... EX043B23C116 – Igneous (Ig) Absaroka Subalpine Zone
    - ii. Soil with sedimentary bedrock, common on windswept ridges, (if productivity is high and  $> 35\%$  rock fragments are present use Gravelly (Gr)) ... EX043B23C176 – Very Shallow (VS) Absaroka Subalpine Zone
  - 2 Soils shallow, productivity potential is LOW
    - i. Soil derived from igneous parent material (igneous or volcanic bedrock) ... EX043B23C160 – Shallow Igneous (SwIg) Absaroka Subalpine Zone
    - ii. Soil derived from sedimentary parent material (i.e. sandstone or shale bedrock) ... EX043B23C157 – Shallow Sedimentary (SwS) Absaroka Subalpine Zone
- B. Soils moderately deep to very deep ( $> 20"$  (50 cm) to bedrock (lithic or paralithic contact)
  - 1 Soil is skeletal ( $> 35\%$  rock fragments<sup>7</sup>) in the upper 20" (50 cm) of the mineral soil surface
    - i. Soil is skeletal within the upper 8" (20 cm) of the mineral soil surface
      - a. Soil has  $< 18\%$  clay; surface fragments and fragments in the soil profile are dominantly  $< 3"$  (76mm) in diameter, but may range in size ... EX043B23C112 – Gravelly (Gr) Absaroka Subalpine Zone
      - b. Soil has  $\geq 18\%$  but  $< 60\%$  clay; surface fragments and fragments in the soil profile are dominantly  $\geq 3"$  (76mm) in diameter but  $< 10"$  (250 mm), but may range in size ... EX043B23C175 – Skeletal (Sk) Absaroka Subalpine Zone
    - ii. Soil is skeletal starting within the upper 8-20" (20-50 cm) from the mineral soil surface; Soil has  $\geq 18\%$  but  $< 60\%$  clay through the upper 20" (50 cm) of the mineral soil surface
      - a. Fragments typically consisting of stones and boulders (fragments  $> 10"$  (250 mm) in diameter), surface fragments (3-15%) increase in stones and boulders, common on Glacial outwash
        - 1) Slope  $> 20\%$  ... EX043B23C170 – Steep Stony Upland (SStU) Absaroka Subalpine Zone
        - 2) Slope  $\leq 20\%$  ... EX043B23C172 – Stony Upland (StU) Absaroka Subalpine Zone

- b. Fragments typically consisting of cobbles (fragments are dominantly > 3" (76 mm) but < 10" (250 mm) in diameter); a few stones and boulders (0-3%) are present, common on landslides ...

EX043B23C109 – Cobbly Upland (CoU) Absaroka Subalpine Zone

2 Soil is not skeletal in the upper 20" (50 cm) of the mineral soil surface

- i. Soil has  $\geq 35\%$  clay starting within the upper 4" (10 cm) from the mineral soil surface
  - a. Abrupt clay increase<sup>6</sup> to > 40% clay present within 4-8" (10-20 cm) of the mineral soil surface, significant surface cracking ... EX043B23C110 – Dense Clay (DC) Absaroka Subalpine Zone
  - b. Soil has  $\geq 35\%$  clay throughout the upper 20" (10 cm) of mineral soil ... EX043B23C104 – Clayey (Cy) Absaroka Subalpine Zone
- ii. Site not as above
  - a. Soil has < 18% clay starting within the upper 4" (10 cm) and continues throughout the upper 20" (50 cm) of mineral soil ... EX043B23C150 – Sandy (Sy) Absaroka Subalpine Zone
  - b. Soil has  $\geq 18\%$  but < 35% clay in the upper 20" (50 cm) of the mineral soil surface in Absaroka Mountains
    - 1) Soils derived from granitic parent material (currently specific to Bighorn Mtns) ... EX043B23C113 – Granitic Loamy (GLy) Absaroka Subalpine Zone
    - 2) Soil derived from sedimentary parent material (i.e. sandstone or shale bedrock)
      - a) Slope > 20%, may have indications of terrecettes ... EX043B23C168 – Steep Loamy (SLy) Absaroka Subalpine Zone
      - b) Slope  $\leq 20\%$  ... EX043B23C122 – Loamy (Ly) Absaroka Subalpine Zone
  - c. Soil has  $\geq 18\%$  but < 35% clay in the upper 20" (50 cm) of the mineral soil surface in Bighorn Mountains
    - 1) Soils derived from granitic parent material (currently specific to Bighorn Mtns) ... EX043B05C113 – Granitic Loamy Bighorn Mountains Sub-alpine Zone
    - 2) Soil derived from sedimentary parent material (i.e. sandstone or shale bedrock) ... EX043B05C122 – Loamy Bighorn Mountains Sub-alpine Zone

1. For areas that receive additional moisture through snow trapping, consider adjusting to a wetter LRU consistent with the vegetation observed for the site keyed. It is anticipated that most snow-trap sites will not have a water table.

2. Specific plant species listed in the key are not to be used as the only determining factor. Management or disturbance may have removed or altered the plant composition that could reflect the wrong ecological site.

6. The dense clay site will have a lighter textured cap or "A" horizon with an abrupt clay increase, which will then back off or become lighter as move lower in the profile. The abrupt increase in the upper portion of the profile with significant cracking is the key for this site. Clayey may have a lighter textured cap but typically maintains or increases in clay as move through the profile.

7. When calculating percent rock fragments in the profile to determine if a site is skeletal, pararock fragments (parachanners) are not considered, however, channers are. The difference between a parachanner and a channer is how "hard" the rock is. Soft flat fragments (ruptured by hand) are parachanners, while harder flat fragments are channers.

## MLRA 43B Wyoming East Divide Absaroka Upper Foothills Ecological Site Key

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I. Site receives additional effective moisture<sup>1</sup> – If no, refer to Group II

A. Sites with a water table present for at least part of the growing season, site dominated by hydrophilic plants (ie. Wetland sedges, bulrushes, willows, tufted hairgrass, etc)<sup>2</sup>

1 Site has water above soil surface part of the growing season, and a water table present within 0-12" (0-30 cm) annually ... EX043B23B178 – Wetland (WL) Absaroka Upper Foothills

2 Site has a seasonal water table

- i. Soil is saline, saline-sodic, or sodic<sup>5</sup> ( $SAR \geq 13$ , or an  $EC \geq 4$  dS/m) in the upper 4" (10 cm) of mineral soil; salt tolerant plants dominate site (i.e. greasewood, alkali sacaton, Nuttall's alkaligrass, alkli bluegrass, alkali cordgrass, inland saltgrass, etc)<sup>2</sup>
  - a. Seasonal water table is between 12-40" (30-100 cm) below the soil surface ... EX043B23B142 –

Saline Subirrigated (SS) Absaroka Upper Foothills

b. Seasonal water table > 40" (100 cm) below mineral soil surface; site regularly receives higher than normal soil moisture because of run-in or stream overflow ... EX043B23B138 – Saline Lowland (SL) Absaroka Upper Foothills

ii. Soil is non-saline, non-saline-sodic, non-sodic

a. Seasonal water table is between 12-40" (30-100 cm) below the soil surface ... EX043B23B174 – Subirrigated (Sb) Absaroka Upper Foothills

b. Seasonal water table > 40" (100 cm) below the mineral soil surface; site regularly receives higher than normal soil moisture because of run-in or stream overflow ... EX043B23B128 – Lowland (LL) Absaroka Upper Foothills

B. Site receives periodic overflow from adjacent slopes, but without a water table within 78" (200 cm)

1 Soil is saline, saline-sodic, or sodic<sup>5</sup>; site typically occurs on stream terraces along incised channels, and is dominated by greasewood<sup>2</sup> and other salt tolerant plants (i.e. Gardner's saltbush, alkali sacaton)<sup>2</sup> ...

EX043B23B140 – Saline Lowland Drained (SLDr) Absaroka Upper Foothills

2 Soil is non-saline, non-saline-sodic, non-sodic; occur on floodplain steps, terraces, concave landscape positions, and positions lower in the landscape

i. Soil has ≥ 35% clay in the upper 8" (20 cm) of the mineral soil surface ... EX043B23B106 – Clayey Overflow (CyO) Absaroka Upper Foothills

ii. Soil has < 35% clay in the upper 8" (20 cm) of the mineral soil surface ... EX043B23B130 – Overflow (Ov) Absaroka Upper Foothills

II. Site does not receive additional effective moisture<sup>1</sup>

A. Soil is saline, saline-sodic, or sodic<sup>5</sup> (SAR ≥ 13, or an EC ≥ 4 dS/m) in the upper 20" (50 cm) of the mineral soil surface; site is dominated by salt tolerant plants (i.e. Gardner's saltbush, greasewood, alkali sacaton, alkali seepweed, etc)<sup>2</sup>

1 Soil is very shallow (< 10" (25 cm) to shale (lithic or paralithic contact)); productivity very low ... EX043B23B154 – Shale (Sh) Absaroka Upper Foothills

2 Soil is shallow to very deep (≥ 10" (25 cm) to bedrock (lithic or paralithic contact)) ... EX043B23B144 – Saline Upland (SU) Absaroka Upper Foothills

B. Soil is non-saline, non-saline-sodic, non-sodic in the upper 20" (50 cm) of the mineral soil surface

1 Soil is very shallow (< 10" (25 cm) or shallow (< 20" (50 cm) to bedrock (lithic or paralithic contact))

i. Soils very shallow, includes areas of exposed bedrock and may include pockets of deep soil, often on steep (up to 60%) slopes with very low productivity potential

a. Soil with igneous or volcanic bedrock<sup>8</sup> or are found on limestone parent material with a dominance of Black sagebrush ... EX043B23B116 – Igneous (Ig) Absaroka Upper Foothills

b. Soil with sedimentary bedrock, common on windswept ridges, (if productivity is high and > 35% rock fragments are present use Gravelly(Gr)) ... EX043B23B176 – Very Shallow (VS) Absaroka Upper Foothills

ii. Soils shallow, productivity potential is LOW

a. Soil derived from limestone or an igneous parent material (igneous or volcanic bedrock)<sup>8</sup>, with a dominance of black sagebrush ... EX043B23B160 – Shallow Igneous (SwIg) Absaroka Upper Foothills

b. Soil derived from sedimentary parent material (i.e. sandstone or shale bedrock)

1) Soil has ≥ 35% clay ... EX043B23B158 – Shallow Clayey (SwCy) Absaroka Upper Foothills

2) Soil has < 18% clay ... EX043B23B166 – Shallow Sandy (SwSy) Absaroka Upper Foothills

3) Soil has ≥ 18% but < 35% clay ... EX043B23B162 – Shallow Loamy (SwLy) Absaroka Upper Foothills

2 Soils moderately deep to very deep (> 20" (50 cm) to bedrock (lithic or paralithic contact))

i. Soil is skeletal (> 35% rock fragments<sup>7</sup>) in the upper 20" (50 cm) of the mineral soil surface

a. Soil is skeletal throughout the upper 20" (50 cm) of the mineral soil surface

- 1) Soil has < 18% clay; surface fragments and fragments in the soil profile are dominantly < 3" (76mm) in diameter, but range in size ... EX043B23B112 – Gravelly (Gr) Absaroka Upper Foothills
- 2) Soil has ≥ 18% but < 60% clay; surface fragments and fragments in the soil profile are dominantly ≥ 3" (76mm) in diameter but < 10" (250 mm), but may range in size
  - a) Violent effervescence<sup>3</sup> starting within 4" (10 cm) from the mineral soil surface, calcium carbonate increases with depth ... EX043B23B121 – Limy Skeletal (LiSk) Absaroka Upper Foothills
  - b) None to strong<sup>3</sup> effervescence in the upper 4" (10 cm) of the mineral soil surface ... EX043B23B175 – Skeletal (Sk) Absaroka Upper Foothills
- b. Soil is skeletal starting within the upper 8-20" (20-50 cm) from the mineral soil surface
  - 1) Soil has < 18% clay through the upper 20" (50 cm) of the mineral soil surface and fragments are comprised of sedimentary channers and/or flagstones ... EX043B23B100 – Channery Upland (CnU) Absaroka Upper Foothills
  - 2) Soil has ≥ 18% but < 60% clay through the upper 20" (50 cm) of the mineral soil surface
    - a) Fragments typically consisting of stones and boulders (fragments > 10" (250 mm) in diameter), surface fragments (5-15%) increase in stones and boulders, common on but not limited to Glacial outwash
      - (1) Slope ≥ 20% ... EX043B23B170 – Steep Stony Upland (SStU) Absaroka Upper Foothills
      - (2) Slope < 20% ... EX043B23B172 – Stony Upland (StU) Absaroka Upper Foothills
    - b) Fragments typically consisting of cobbles (fragments are dominantly > 3" (76 mm) but < 10" (250 mm) in diameter); a few stones and boulders (0-5%) are present, common on but not limited to landslides ... EX043B23B109 – Cobbly Upland (CoU) Absaroka Upper Foothills
- ii. Soil is not skeletal in the upper 20" (50 cm) of the mineral soil surface
  - a. Soil has ≥ 35% clay throughout the upper 20" (50 cm) of the mineral soil – may have a lighter textured cap or may decrease lower in the profile
    - 1) Abrupt clay increase<sup>6</sup> to > 40% clay present within 4-8" (10-20 cm) of the mineral soil surface, significant surface cracking; plant community dominated by birdfoot sagebrush<sup>2</sup> ... EX043B23B110 – Dense Clay (DC) Absaroka Upper Foothills
    - 2) Soil has ≥ 35% clay starting within the upper 4" (10 cm) and continues throughout the upper 20" (50 cm) of mineral soil surface; plant community dominated by Wyoming or Mountain big sagebrush<sup>2</sup> ... EX043B23B104 – Clayey (Cy) Absaroka Upper Foothills
  - b. Soil has <35% clay throughout the upper 20" (50 cm) of the mineral soil – may see individual horizons that are above 35% clay, but on average, the soil profile is less than 35% clays
    - 1) Soil has < 18% clay starting within the upper 4" (10 cm) and continues throughout the upper 20" (50 cm) of mineral soil ... EX043B23B150 – Sandy (Sy) Absaroka Upper Foothills
    - 2) Soil has ≥ 18% but < 35% clay in the upper 20" (50 cm) of the mineral soil surface
      - a) Soil is calcareous (violent effervescence<sup>3</sup>) within 20" (50 cm) of the mineral soil surface
        - (1) Soil is calcareous within the upper 8" (20 cm) of the mineral soil surface, calcium carbonate increases with depth ... EX043B23B120 – Limy Upland (LiU) Absaroka Upper Foothills
        - (2) Soil is calcareous starting within the upper 8-20" (20-50 cm) from the mineral soil surface ... EX043B23B123 – Loamy Calcareous (LyCa) Absaroka Upper Foothills
      - b) Soil is non-calcareous within 20" (50 cm) of the mineral soil surface
        - (1) Soils derived from granitic/intrusive igneous parent material ... EX043B23B113 – Granitic Loamy (GLy) Absaroka Upper Foothills
        - (2) Soils derived from sedimentary or a mix of parent materials

(a) Slope  $\geq 20\%$ , may have indications of terrecettes ... EX043B23B168 – Steep Loamy (SLy) Absaroka Upper Foothills

(b) Slope  $< 20\%$  ... EX043B23B122 – Loamy (Ly) Absaroka Upper Foothills

<sup>1</sup> 1. For areas that receive additional moisture through snow trapping, consider adjusting to a wetter LRU consistent with the vegetation observed for the site keyed. It is anticipated that most snow-trap sites will not have a water table.

<sup>2</sup> 2. Specific plant species listed in the key are not to be used as the only determining factor. Management or disturbance may have removed or altered the plant composition that could reflect the wrong ecological site.

<sup>3</sup> 3. Soils derived from Dolomite or similar geology may not react as “violently” as other calcareous parent materials; dolomite site may be loamy calcareous with only a strong effervescence. Soils with  $< 18\%$  clays only need a CCE of 5% to be calcic or calcareous, while soils with  $> 18\%$  clays need a CCE of 15%.

<sup>5</sup> 5. Saline, saline sodic, and sodic soils have a pH of 7.9 to 9.0 and an EC (electrical conductivity)  $> 4$  dS/m [dS/m = mmhos/cm]. Salts, including gypsum will lower the pH without affecting the EC. Soils that are sodic generally have a SAR of  $\geq 13$  typically have a pH of 8.8 or higher.

<sup>6</sup> 6. The dense clay site will have a lighter textured cap or “A” horizon with an abrupt clay increase, commonly the clay percent will then decrease as move lower in the profile. The abrupt increase in the upper portion of the profile with significant cracking is the key for this site. Clayey may have a lighter textured cap but typically maintains or increases in clay as move through the profile.

<sup>7</sup> 7. When calculating percent rock fragments in the profile to determine if a site is skeletal, pararock fragments (parachanners) are not considered, however, channers are. The difference between a parachanner and a channer is how “hard” the rock is. Soft flat fragments (ruptured by hand) are parachanners, while harder flat fragments are channers.

## MLRA 43B Wyoming East Divide Absaroka Lower Foothills Ecological Site Key

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### I. Site receives additional effective moisture<sup>1</sup> – If no, refer to Group II

#### A. Sites with a water table present for at least part of the growing season, site dominated by hydrophilic plants (ie. Wetland sedges, bulrushes, willows, tufted hairgrass, etc)<sup>2</sup>

1 Site has water above soil surface part of the growing season, and a water table present within 0-12” (0-30 cm) annually ... EX043B23A178 – Wetland (WL) Absaroka Lower Foothills

2 Site has a seasonal water table

i. Soil is saline, saline-sodic, or sodic<sup>5</sup> (SAR  $\geq 13$ , or an EC  $\geq 4$  dS/m) in the upper 4” (10 cm) of mineral soil; salt tolerant plants dominate site (i.e. greasewood, alkali sacaton, Nuttall’s alkaligrass, alkli bluegrass, alkali cordgrass, inland saltgrass, etc)<sup>2</sup>

a. Seasonal water table is between 12-40” (30-100 cm) below the soil surface ... EX043B23A142 – Saline Subirrigated (SS) Absaroka Lower Foothills

b. Seasonal water table  $> 40$ ” (100 cm) below mineral soil surface; site regularly receives higher than normal soil moisture because of run-in or stream overflow ... EX043B23A138 – Saline Lowland (SL) Absaroka Lower Foothills

ii. Soil is non-saline, non-saline-sodic, non-sodic

a. Seasonal water table is between 12-40” (30-100 cm) below the soil surface ... EX043B23A174 – Subirrigated (Sb) Absaroka Lower Foothills

b. Seasonal water table  $> 40$ ” (100 cm) below the mineral soil surface; site regularly receives higher than normal soil moisture because of run-in or stream overflow ... EX043B23A128 – Lowland (LL) Absaroka Lower Foothills

#### B. Site receives periodic overflow from adjacent slopes, but without a water table within 78” (200 cm)

1 Soil is saline, saline-sodic, or sodic<sup>5</sup>; site typically occurs on stream terraces along incised channels, and is dominated by greasewood<sup>2</sup> and other salt tolerant plants (i.e. Gardner’s saltbush, alkali sacaton)<sup>2</sup> ... EX043B23A140 – Saline Lowland Drained (SLDr) Absaroka Lower Foothills

2 Soil is non-saline, non-saline-sodic, non-sodic; occur on floodplain steps, terraces, concave landscape positions, and positions lower in the landscape

i. Soil has  $\geq 35\%$  clay in the upper 8” (20 cm) of the mineral soil surface ... EX043B23A106 – Clayey Overflow (CyO) Absaroka Lower Foothills

- ii. Soil has < 35% clay in the upper 8" (20 cm) of the mineral soil surface ... EX043B23A130 – Overflow (Ov) Absaroka Lower Foothills

II. Site does not receive additional effective moisture<sup>1</sup>

A. Soil is saline, saline-sodic, or sodic<sup>5</sup> (SAR ≥ 13, or an EC ≥ 4 dS/m) in the upper 20" (50 cm) of the mineral soil surface; site is dominated by salt tolerant plants (i.e. Gardner's saltbush, greasewood, alkali sacaton, alkali seepweed, etc)<sup>2</sup>

1 Soil is very shallow (< 10" (25 cm) to shale (lithic or paralithic contact)); productivity very low ...

EX043B23A154 – Shale (Sh) Absaroka Lower Foothills

2 Soil is shallow to very deep (≥10" (25 cm) to bedrock (lithic or paralithic contact)) ... EX043B23A144 – Saline Upland (SU) Absaroka Lower Foothills

B. Soil is non-saline, non-saline-sodic, non-sodic in the upper 20" (50 cm) of the mineral soil surface

1 Soil is very shallow (< 10" (25 cm) or shallow (< 20" (50 cm) to bedrock (lithic or paralithic contact))

i. Soils very shallow, includes areas of exposed bedrock and may include pockets of deep soil, often on steep (up to 60%) slopes with very low productivity potential

a. Soil with igneous or volcanic bedrock<sup>8</sup> or are found on limestone parent material with a dominance of black sagebrush ... EX043B23A116 – Igneous (Ig) Absaroka Lower Foothills

b. Soil with sedimentary bedrock, common on windswept ridges, (if productivity is high and > 35% rock fragments are present use Gravelly(Gr)) ... EX043B23A176 – Very Shallow (VS) Absaroka Lower Foothills

ii. Soils shallow, productivity potential is LOW

a. Soil derived from limestone or an igneous parent material (igneous or volcanic bedrock)<sup>8</sup>, with a dominance of black sagebrush ... EX043B23A160 – Shallow Igneous (SwIg) Absaroka Lower Foothills

b. Soil derived from sedimentary parent material (i.e. sandstone or shale bedrock)

1) Soil has ≥ 35% clay ... EX043B23A158 – Shallow Clayey (SwCy) Absaroka Lower Foothills

2) Soil has < 18% clay ... EX043B23A166 – Shallow Sandy (SwSy) Absaroka Lower Foothills

3) Soil has ≥ 18% but < 35% clay ... EX043B23A162 – Shallow Loamy (SwLy) Absaroka Lower Foothills

2 Soils moderately deep to very deep (> 20" (50 cm) to bedrock (lithic or paralithic contact))

i. Soil is skeletal (> 35% rock fragments<sup>7</sup>) in the upper 20" (50 cm) of the mineral soil surface

a. Soil is skeletal throughout the upper 20" (50 cm) of the mineral soil surface

1) Soil has < 18% clay; surface fragments and fragments in the soil profile are dominantly < 3" (76mm) in diameter, but may range in size ... EX043B23A112 – Gravelly (Gr) Absaroka Lower Foothills

2) Soil has ≥ 18% but < 60% clay; surface fragments and fragments in the soil profile are dominantly ≥ 3" (76mm) in diameter but < 10" (250 mm), but may range in size

a) Violent effervescence<sup>3</sup> starting within 4" (10 cm) from the mineral soil surface, calcium carbonate increases with depth ... EX043B23A121 – Limy Skeletal (LiSk) Absaroka Lower Foothills

b) None to slight effervescence<sup>3</sup> in the upper 4" (10 cm) of the mineral soil surface ... EX043B23A175 – Skeletal (Sk) Absaroka Lower Foothills

b. Soil is skeletal starting within the upper 8-20" (20-50 cm) from the mineral soil surface

1) Soil has < 18% clay through the upper 20" (50 cm) of the mineral soil surface and fragments are comprised of sedimentary channers and/or flagstones ... EX043B23A100 – Channery Upland (CnU) Absaroka Lower Foothills

2) Soil has ≥ 18% but < 60% clay through the upper 20" (50 cm) of the mineral soil surface

a) Fragments typically consisting of stones and boulders (fragments > 10" (250 mm) in diameter), surface fragments (5-15%) increase in stones and boulders, common on Glacial outwash ... EX043B23A172 – Stony Upland (StU) Absaroka Lower Foothills

- b) Fragments typically consisting of cobbles (fragments are dominantly > 3" (76 mm) but < 10" (250 mm) in diameter); a few stones and boulders (0-5%) are present, common on landslides ... EX043B23A109 – Cobbly Upland (CoU) Absaroka Lower Foothills
  - ii. Soil is not skeletal in the upper 20" (50 cm) of the mineral soil surface
    - a. Soil has ≥ 35% clay throughout the upper 20" (50 cm) of the mineral soil – may have a lighter textured cap or may decrease lower in the profile
      - 1) Abrupt clay increase<sup>6</sup> to > 40% clay present within 4-8" (10-20 cm) of the mineral soil surface, significant surface cracking (plant community dominated by birdfoot sagebrush) ... EX043B23A110 – Dense Clay (DC) Absaroka Lower Foothills
      - 2) Soil has ≥ 35% clay starting within the upper 4" (10 cm) and continues throughout the upper 20" (50 cm) of mineral soil surface; plant community dominated by Wyoming or Mountain big sagebrush<sup>2</sup> ... EX043B23A104 – Clayey (Cy) Absaroka Lower Foothills
    - b. Site not as above
      - 1) Soil has < 18% clay starting within the upper 4" (10 cm) and continues throughout the upper 20" (50 cm) of mineral soil ... EX043B23A150 – Sandy (Sy) Absaroka Lower Foothills
      - 2) Soil has ≥ 18% but < 35% clay in the upper 20" (50 cm) of the mineral soil surface
        - a) Soil is calcareous (violent effervescence<sup>3</sup>) within 20" (50 cm) of the mineral soil surface
          - (1) Soil is calcareous within the upper 8" (20 cm) of the mineral soil surface, calcium carbonate increases with depth ... EX043B23A120 – Limy Upland (LiU) Absaroka Lower Foothills
          - (2) Soil is calcareous starting within the upper 8-20" (20-50 cm) from the mineral soil surface ... EX043B23A123 – Loamy Calcareous (LyCa) Absaroka Lower Foothills
        - b) Soil is non-calcareous (none to slight effervescence<sup>3</sup>) within 20" (50 cm) of the mineral soil surface ... EX043B23A122 – Loamy (Ly) Absaroka Lower Foothills

1. For areas that receive additional moisture through snow trapping, consider adjusting to a wetter LRU consistent with the vegetation observed for the site keyed. It is anticipated that most snow-trap sites will not have a water table.

2. Specific plant species listed in the key are not to be used as the only determining factor. Management or disturbance may have removed or altered the plant composition that could reflect the wrong ecological site.

3. Soils derived from Dolomite or similar geology may not react as "violently" as other calcareous parent materials; dolomite site may be loamy calcareous with only a strong effervescence. Soils with < 18% clays only need a CCE of 5% to be calcic or calcareous, while soils with >18% clays need a CCE of 15%.

5. Saline, saline sodic, and sodic soils have a pH of 7.9 to 9.0 and an EC (electrical conductivity) > 4 dS/m [dS/m = mmhos/cm]. Salts, including gypsum will lower the pH without affecting the EC. Soils that are sodic generally have a SAR of ≥ 13 typically have a pH of 8.8 or higher.

6. The dense clay site will have a lighter textured cap or "A" horizon with an abrupt clay increase, commonly the clay percent will then decrease as move lower in the profile. The abrupt increase in the upper portion of the profile with significant cracking is the key for this site. Clayey may have a lighter textured cap but typically maintains or increases in clay as move through the profile.

7. When calculating percent rock fragments in the profile to determine if a site is skeletal, pararock fragments (parachanners) are not considered, however, channers are. The difference between a parachanner and a channer is how "hard" the rock is. Soft flat fragments (ruptured by hand) are parachanners, while harder flat fragments are channers.

## ARCHIVED: Key to Ecological Sites MLRA 43B Zone 1: 20+ M

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I. Site in a lowland position that receives significant additional moisture from runoff of adjacent slopes or from intermittent/perennial streams or a water table (HIGH Productivity Potential)

A. Site poorly drained with water table above surface part of growing season, Nebraska sedge, northern reedgrass, tufted hairgrass, and willows common species ... R043BY178WY – Wetland High Mountains

B. Site not as above

1 Water table within rooting depth of herbaceous species (typically above 20") during part of the growing season, tufted hairgrass, Nebraska sedge, shrubby cinquefoil, sedges, rushes, and willow common ... R043BY174WY – Subirrigated High Mountains

2 Site receives periodic overflow from adjacent slopes, but without a water table within rooting depth of woody plants, and soil textures are loamy, serviceberry, silver sagebrush, slender wheatgrass, and basin wildrye common ... R043BY130WY – Overflow High Mountains

II. Upland site that does not receive additional moisture as above

A. Soil depth very shallow (<10”), shallow (10-20”) OR moderately deep to deep (>20”) reacting like shallow soils due to root restrictive layer or on south and west facing slopes (LOW productivity potential)

1 Soils very shallow (<10”), but may include areas of exposed bedrock and pockets of deep soil, often on steep (up to 55%) south and west facing slopes with VERY LOW productivity potential

i. Bedrock igneous or volcanic, three-tip sagebrush, antelope bitterbrush, and black sage common shrubs ... R043BY116WY – Igneous High Mountains

ii. Fractured bedrock of various types except igneous or volcanic, commonly on windswept ridges, bluebunch wheatgrass, Columbia needlegrass and a variety of shrub species dominate ... R043BY176WY – Very Shallow High Mountains

2 Soils shallow (10-20”), but may include moderately deep to deep gravelly or cobbly soils, soils with a root restrictive layer, and/or south and west facing slopes that react like shallow soils, productivity potential is LOW

i. Coarse fragments common on surface and throughout profile (>35% by volume in top 20”), low sagebrush and bitterbrush common shrubs ... R043BY172WY – Stony High Mountains

ii. Soils without high amount of coarse fragments

a. Medium to moderately coarse textured soils over igneous or volcanic bedrock, bitterbrush and three-tip sagebrush common ... R043BY160WY – Shallow Igneous High Mountains

b. Very fine sandy loam to clay loam textured soils over various bedrock types (commonly limestone, siltstone, or shale), low sagebrush intermixed with big sagebrush ... R043BY162WY – Shallow Loamy High Mountains

B. Soil depth moderately deep to deep (>20”) without root restricting layer that inhibits the productivity potential

1 Sites with a high volume of coarse fragments in top 20” (>35% by volume)

i. Site occurs in a variety of upland positions, boulders found in abundance on surface, bluebunch wheatgrass, Idaho fescue, spike fescue, bitterbrush, and big sage common, productivity high ... R043BY108WY – Coarse Upland High Mountains

ii. Site occurs on steep south and west facing mountain slopes, bluebunch wheatgrass, Idaho fescue, and spike fescue dominant grasses, mountain mahogany common shrub ... R043BY170WY – Steep Stony High Mountains

2 Sites without high volume of coarse fragments

i. Soil textures are heavy, slight to severe soil cracking in dry conditions low sagebrush and green rabbitbrush common shrubs ... R043BY110WY – Dense Clay High Mountains

ii. Soils very fine sandy loams to clay loams, a good variety and even mix of grass species, mountain big sagebrush dominant shrub

a. Site occurs on steep north and east facing mountain slopes, mixed mountain shrub community often with aspen ... R043BY168WY – Steep Loamy High Mountains

b. Soils very fine sandy loams to clay loams, a good variety and even mix of grass species, mountain big sagebrush dominant shrub ... R043BY122WY – Loamy High Mountains

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**ARCHIVED: Key to Ecological Sites MLRA 43B Zone 2: 15-19 W**

I. Site in a lowland position that receives significant additional moisture from runoff of adjacent slopes or from intermittent/perennial streams or a water table (HIGH Productivity Potential)

A. Sites that are saline and/or alkaline, dominated by salt tolerant species (inland saltgrass, alkali sacaton, alkali bluegrass, Nuttall's alkaligrass, alkali muhly) ... R043BY242WY – Saline Subirrigated Foothills and Mountains West

B. Sites that are not saline and/or alkaline

1 Site poorly drained with water table above surface part of growing season, Nebraska sedge, water sedge, and willows common species ... R043BY278WY – Wetland Foothills and Mountains West

2 Site not as above

i. Water table within rooting depth of herbaceous species (typically above 20") during part of the growing season, tufted hairgrass, shrubby cinquefoil, sedges, rushes, and willows common ... R043BY274WY – Subirrigated Foothills and Mountains West

ii. Site not as above

a. Site receives periodic overflow from adjacent slopes, but without a water table within rooting depth of woody plants, and soil textures are loamy, silver sagebrush, slender wheatgrass, and basin wildrye common ... R043BY230WY – Overflow Foothills and Mountains West

b. Site similar to above with heavy textured soils (finer portions of silty clay loams to sandy clay loams and clay loams), heavy presence of rhizomatous wheatgrass ... R043BY206WY – Clayey Overflow Foothills and Mountains West

II. Upland site that does not receive additional moisture as above

A. Soil depth very shallow (<10"), shallow (10-20") OR moderately deep to deep (>20") reacting like shallow soils due to root restrictive layer or on south and west facing slopes (LOW productivity potential)

1 Soils very shallow (<10"), but may include areas of exposed bedrock and pockets of deep soil, often on steep (up to 55%) south and west facing slopes with VERY LOW productivity potential

i. Bedrock igneous or volcanic, three-tip sagebrush, mountain mahogany, and black sage common shrubs ... R043BY216WY – Igneous Foothills and Mountains West

ii. Fracture bedrock of various types except igneous or volcanic, commonly on windswept ridges, bluebunch wheatgrass and a variety of shrub species dominate ... R043BY276WY – Very Shallow Foothills and Mountains West

2 Soils shallow (10-20"), but may include moderately deep to deep gravelly or cobbly soils, soils with a root restrictive layer, and/or south and west facing slopes that react like shallow soils, productivity potential is LOW

i. Coarse fragments common on surface and throughout profile (>35% by volume in top 20")

a. Site occurs along terrace breaks, steep slopes or along streams terraces with coarse fragments up to 3" diameter covering 50-75% of surface and making up >35% volume in top 20", may have lime horizon below 12 inches, bluebunch wheatgrass, bitterbrush, and black sagebrush are common, productivity potential VERY LOW ... R043BY212WY – Gravelly Foothills and Mountains West

b. Coarse fragments are larger than 3" and often dominated by a variety of shrubs such as bitterbrush, low sage, mountain big sage, serviceberry, and green rabbitbrush ... R043BY272WY – Stony Foothills and Mountains West

ii. Soils without high amount of coarse fragments

a. Medium to moderately coarse textured soils over igneous or volcanic bedrock, bitterbrush and three-tip sagebrush common ... R043BY260WY – Shallow Igneous Foothills and Mountains West

b. Very fine sandy loam to clay loam textured soils over various bedrock types (commonly limestone, siltstone, or shale), low sagebrush intermixed with big sagebrush ... R043BY262WY – Shallow Loamy Foothills and Mountains West

B. Soil depth moderately deep to deep (>20") without root restricting layer that inhibits the productivity potential

1 Sites with a high volume of coarse fragments in top 20" (>35% by volume)

i. Site occurs in a variety of upland positions, boulders found in abundance on surface, bluebunch wheatgrass, Idaho fescue, spike fescue, bitterbrush, and big sage common, productivity high ...

R043BY208WY – Coarse Upland Foothills and Mountains West

ii. Site occurs on steep south and west facing mountain slopes, bluebunch wheatgrass, Idaho fescue, and spike fescue dominant grasses, mountain mahogany common shrub ... R043BY270WY – Steep Stony Foothills and Mountains West

2 Sites without high volume of coarse fragments

i. Soil textures are heavy, slight to severe soil cracking in dry conditions

a. Soil textures range from silty clay through finer silty and sandy clay loams, soil cracking common during dry summer months, though not severe, serviceberry common shrub with a lot of western needlegrass and rhizomatous wheatgrass ... R043BY204WY – Clayey Foothills and Mountains West

b. Heavy clay soils with severe soil cracking in dry conditions, very sticky when wet, low sagebrush common shrub ... R043BY210WY – Dense Clay Foothills and Mountains West

ii. Soils very fine sandy loams to clay loams, a good variety and even mix of grass species, mountain big sagebrush dominant shrub ... R043BY222WY – Loamy Foothills and Mountains West

## **ARCHIVED: Key to Ecological Sites MLRA 43B Zone 6: 15-19 E**

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I. Site in a lowland position that receives significant additional moisture from runoff of adjacent slopes or from intermittent/perennial streams or a water table (HIGH Productivity Potential)

A. Site poorly drained with water table above surface part of growing season, Nebraska sedge, northern reedgrass, tufted hairgrass, and willows common species ... R043BY378WY – Wetland (WL) 15-19" Foothills and Mountains East Precipitation Zone

B. Site not as above

1 Water table within rooting depth of herbaceous species (typically above 20") during part of the growing season, tufted hairgrass, Nebraska sedge, shrubby cinquefoil, sedges, rushes, and willow common ... R043BY374WY – Subirrigated (Sb) 15-19" Foothills and Mountains East Precipitation Zone

2 Site receives periodic overflow from adjacent slopes, but without a water table within rooting depth of woody plants, and soil textures are loamy, serviceberry, silver sagebrush, slender wheatgrass, and basin wildrye common ... R043BY330WY – Overflow (Ov) 15-19" Foothills and Mountains East Precipitation Zone

II. Upland site that does not receive additional moisture as above

A. Soil depth very shallow (<10"), shallow (10-20") OR moderately deep to deep (>20") reacting like shallow soils due to root restrictive layer or on south and west facing slopes (LOW productivity potential)

1 Soils very shallow (<10"), but may include areas of exposed bedrock and pockets of deep soil, often on steep (up to 55%) south and west facing slopes with VERY LOW productivity potential

i. Bedrock igneous or volcanic, three-tip sagebrush, antelope bitterbrush, and black sage common shrubs ... R043BY316WY – Igneous (Ig) 15-19" Foothills and Mountains East Precipitation Zone

ii. Fractured bedrock of various types except igneous or volcanic, commonly on windswept ridges, bluebunch wheatgrass, Columbia needlegrass and a variety of shrub species dominate ... R043BY376WY – Very Shallow (VS) 15-19" Foothills and Mountains East Precipitation Zone

2 Soils shallow (10-20"), but may include moderately deep to deep gravelly or cobbly soils, soils with a root restrictive layer, and/or south and west facing slopes that react like shallow soils, productivity potential is LOW

i. Silty clays or heavier textured soils over clay shale bedrock, rhizomatous wheatgrasses, Idaho fescue, bluebunch wheatgrass ... R043BY358WY – Shallow Clayey (SwCy) 15-19" Foothills and Mountains East Precipitation Zone

ii. Site not as above

a. Fine sandy loams or coarser textured soils over sandstone or sandy shale, Columbia needlegrass, Idaho fescue & bluebunch wheatgrass dominant grass species on site ... R043BY366WY – Shallow

Sandy (SwSy) 15-19" Foothills and Mountains East Precipitation Zone

b. Site not as above

1) Medium to moderately coarse textured soils over igneous or volcanic bedrock, bitterbrush, black sage and three-tip sagebrush common ... R043BY360WY – Shallow Igneous (SwIg) 15-19" Foothills and Mountains East Precipitation Zone

2) Very fine sandy loam to clay loam textured soils over various bedrock types (commonly limestone, siltstone, or shale), black sagebrush or mountain mahogany intermixed with big sage ... R043BY362WY – Shallow Loamy (SwLy) 15-19" Foothills and Mountains East Precipitation Zone

B. Soil depth moderately deep to deep (>20") without root restricting layer that inhibits the productivity potential

1 Sites with a high volume of coarse fragments in top 20" (>35% by volume) Site occurs in a variety of upland positions, boulders found in abundance on surface, Columbia needlegrass, Idaho fescue, spike fescue, bitterbrush, and big sage, productivity less than others in group ... R043BY308WY – Coarse Upland (CU) 15-19" Foothills and Mountains East Precipitation Zone

2 Sites without high volume of coarse fragments

i. Soil textures are heavy, slight to severe soil cracking in dry conditions. Soil textures range from silty clay through finer silty and sandy clay loams, soil cracking common during dry summer months, though not severe, big sage common shrub with a lot of Columbia needlegrass, Idaho fescue and rhizomatous wheatgrasses ... R043BY304WY – Clayey (Cy) 15-19" Foothills and Mountains East Precipitation Zone

ii. Site not as above

a. Soils fine sandy loams to loamy sands, light or dark colored, Columbia needlegrass and mountain brome abundant ... R043BY350WY – Sandy (Sy) 15-19" Foothills and Mountains East Precipitation Zone

b. Soils very fine sandy loams to clay loams, a good variety and even mix of grass species, mountain big sagebrush dominant shrub ... R043BY322WY – Loamy (Ly) 15-19" Foothills and Mountains East Precipitation Zone

## ARCHIVED: Ecological Site Key MLRA 43B Zone 13:15-19NP

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I. Site in a lowland position that receives significant additional moisture from runoff of adjacent slopes or from intermittent/perennial streams or a water table (HIGH Productivity Potential)

A. Site poorly drained with water table above surface part of growing season, Nebraska sedge, water sedge, and willows common species ... R043BY478WY – Wetland (WL) 15-19" Northern Plains Precipitation Zone

B. Site not as above

1 Site has a fluctuating water table, with water within the rooting depths of herbaceous or woody species for at least part of the growing season.

i. Water table within rooting depth of herbaceous species (typically above 20") during part of the growing season, tufted hairgrass, shrubby cinquefoil, sedges, rushes, and willows common ... R043BY474WY – Subirrigated (Sb) 15-19" Northern Plains Precipitation Zone

ii. Fluctuating Water table, within rooting depth of woody species (typically greater than 3 ft during part of the growing season) well drained soils; rhizomatous wheatgrasses, green needlegrass and cottonwoods are common ... R043BY428WY – Lowland (LL) 15-19" Northern Plains Precipitation Zone

2 Site receives periodic overflow from adjacent slopes, but without a water table within rooting depth of woody plants, and soil textures are loamy. Silver sagebrush, and basin wildrye common ... R043BY430WY – Overflow (Ov) 15-19" Northern Plains Precipitation Zone

II. Upland site that does not receive additional moisture as above

A. Soil depth very shallow (<10"), shallow (10-20") OR moderately deep to deep (>20") reacting like shallow

soils due to root restrictive layer or on south and west facing slopes (LOW productivity potential)

1 Soils very shallow (<10"), but may include areas of exposed bedrock and pockets of deep soil, often on steep (up to 55%) south and west facing slopes with VERY LOW productivity potential; fracture bedrock of various types, commonly on windswept ridges, bluebunch wheatgrass and a variety of shrub species dominate ... R043BY476WY – Very Shallow (VS) 15-19" Northern Plains Precipitation Zone

2 Soils shallow (10-20"), soils with a root restrictive layer, and/or south and west facing slopes that react like shallow soils

i. Soils are shallow, well drained, sandy, and loamy underlain by soft calcareous materials, with many outcrops of sedimentary bedrock. Deep pockets of soil may occur between the outcrops of bedrock ... R043BY434WY – Rocky Hills (RH) 15-19" Northern Plains Precipitation Zone

ii. Site not as above

a. The soils of this site include the finer portions of sandy clay loam and heavier, are moderately to slowly permeable, and overlay clay shale bedrock; rhizomatous wheatgrasses, Idaho fescue, green needlegrass and Wyoming big sagebrush are common ... R043BY458WY – Shallow Clayey (SwCy) 15-19" Northern Plains Precipitation Zone

b. Soils are fine sandy loams or coarser over all bedrock types except igneous or volcanic; prairie sandreed, needleandthread, and fringed sagewort or prominent on this site ... R043BY466WY – Shallow Sandy (SwSy) 15-19" Northern Plains Precipitation Zone

c. Very fine sandy loam to clay loam textured soils over various bedrock types (commonly limestone, siltstone, or shale), bluebunch wheatgrass, Idaho fescue, and needle and thread common along with big sagebrush ... R043BY462WY – Shallow Loamy (SwLy) 15-19" Northern Plains Precipitation Zone

B. Soil depth moderately deep to deep (>20") without root restricting layer that inhibits the productivity potential

1 Sites with a high volume of coarse fragments in top 20" (>35% by volume); site occurs in a variety of upland positions, boulders found in abundance on surface, bluebunch wheatgrass, Idaho fescue, spike fescue, bitterbrush, and big sage common, productivity high ... R043BY408WY – Coarse Upland (CU) 15-19" Northern Plains Precipitation Zone

2 Sites without high volume of coarse fragments

i. Soil textures are heavy, slight to severe soil cracking in dry conditions; soil textures range from silty clay through finer silty and sandy clay loams, soil cracking common during dry summer months, though not severe, serviceberry common shrub with a lot of western needlegrass and rhizomatous wheatgrass ... R043BY404WY – Clayey (Cy) 15-19" Northern Plains Precipitation Zone

ii. Site not as above

a. Soils ranging from sands to fine sandy loams, a good variety and even mix of grass species, big sagebrush dominant shrub ... R043BY450WY – Sandy (Sy) 15-19" Northern Plains Precipitation Zone

b. Soils very fine sandy loams to clay loams, a good variety and even mix of grass species, big sagebrush dominant shrub ... R043BY422WY – Loamy (Ly) 15-19" Northern Plains Precipitation Zone

## ARCHIVED: Key to Ecological Sites MLRA 32X Zone 7: 10-14 E

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I. Site in a lowland position that receives significant additional moisture from runoff of adjacent slopes or from intermittent/perennial streams or a water table (HIGH Productivity Potential)

A. Sites that are saline and/or alkaline, dominated by salt tolerant species (Greasewood, inland saltgrass, alkali sacaton, alkali muhly)

1 Water table within rooting depth of herbaceous species (typically 20-40") during some or most of the growing season, dominated by grasses such as alkali sacaton, Nuttall's alkaligrass, alkali bluegrass, alkali cordgrass, basin wildrye (typically no shrubs present)

2 Site not as above

- i. Site in a lowland position and water table usually >3 feet (within rooting depth of woody plants, but not within rooting depth of herbaceous plants), dominated by alkali sacaton, greasewood, inland saltgrass, basin wildrye (no big sage on this site)
- ii. Site receives periodic overflow from adjacent slopes, but it is typically channeled into gullies so that plants are not receiving benefit from additional moisture, greasewood and Gardners saltbush common species, big sage sometimes present

B. Sites that are not saline and/or alkaline

1 Site poorly drained with water table above surface part of growing season, Nebraska sedge and willows common species

2 Site not as above

- i. Water table within rooting depth of herbaceous species (typically above 20") during part of the growing season, basin wildrye, shrubby cinquefoil, and willows may be present
- ii. Site not as above
  - a. Site in a lowland position, adjacent to intermittent/perennial stream and water table usually >3 feet (within rooting depth of woody plants, but not within rooting depth of herbaceous plants), cottonwoods or remnants thereof may be present, gravel bars and pockets of bare gravel often present, woods rose and other woody species common
  - b. Site not as above
    - 1) Site receives periodic overflow from adjacent slopes, but without a water table within rooting depth of woody plants, basin big sagebrush, silver sage, slender wheatgrass and/or Canby bluegrass common
    - 2) Site similar to above with heavy textured soils (finer portions of silty clay loams to sandy clay loams and clay loams), heavy presence of rhizomatous wheatgrasses

II. Upland site that does not receive additional moisture as above

A. Soil depth very shallow (<10"), shallow (10-20") OR deep (>20") on south and west facing slopes which react like shallow soils (LOW productivity potential)

1 Soils very shallow (<10"), but include areas of exposed bedrock and pockets of deep soil, often on steep (up to 55%) south and west facing slopes with LOW productivity potential

- i. Bedrock is soft or hard clay shale bedrock that may be saline and/or alkaline in various degrees, Gardner's saltbush common species, productivity very low
- ii. Site not as above, commonly on windswept ridges, fractured bedrock of various types, and Juniper occasionally found on at higher elevations, productivity very low, bluebunch wheatgrass (if productivity is high and coarse fragments are present, go to Gravelly or Shallow\*)

2 Soils shallow (10-20") OR deep, gravelly and/or cobbly soils on south and west facing slopes that react like shallow soils

- i. Coarse fragments common on surface and throughout profile (>35% by volume). Site occurs along terrace breaks or steep slopes with coarse fragments up to 10" diameter covering 50-75% of surface and making up
- ii. Site not as above
  - a. Silty clays or heavier textured soils over clay shale bedrock, birdfoot sage, winterfat & Gardner's saltbush
  - b. Site not as above
    - 1) Fine sandy loams or coarser textured soils over sandstone or sandy shale, needleandthread, Indian ricegrass & bluebunch dominant grass species on site
    - 2) Very fine sandy loams to clay loam textured soils over various bedrock types (commonly limestone, siltstone, or shale)

B. Soil depth moderately deep to deep (>20")

1 Sites that are saline and/or alkaline

- i. Gardners saltbush, winterfat common (if root restrictive layer present and production very low consider

go to Shale)

ii. Site receives periodic overflow from adjacent slopes, but water typically channeled into gullies so that plants are not receiving a lot of benefit from additional moisture, greasewood and Gardners saltbush common species, big sage sometimes present

## 2 Sites that are not saline and/or alkaline

i. Sites with a high volume of coarse fragments in top 20" (>35% by volume)

a. Site occurs along terrace breaks or steep slopes with coarse fragments up to 10" diameter covering 50-75% of surface and making up 40-50% volume in top 20", may have lime horizon below 12 inches, bluebunch wheatgrass and variety of woody plants may be present, productivity low

b. Site occurs in a variety of upland positions, coarse fragments found in abundance on surface, at least 35% volume of coarse fragments in top 20", generally increasing with depth, bluebunch wheatgrass, bitterbrush, and a variety of other shrubs, production higher

ii. Sites without high volume of coarse fragments

a. Soil textures are heavy, slight to severe soil cracking in dry conditions. Soil textures range from silty clay through finer silty and sandy clay loams, soil cracking common during dry summer months, though not severe, Big Sagebrush more common, but sparse, with a lot of western wheatgrass

b. Soil textures not as above

1) Soils fine sandy loams to loamy sands, light or dark colored, Needleandthread and Indian Ricegrass are abundant species

2) Soils very fine sandy loams to clay loams, good variety and even mix of grass species

## MT 43B PES GROUPINGS KEY

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Site potential dominated by herbaceous vegetation (Grassland and Shrubland) – A. Rangeland

### Part I. Abiotic Groupings

1a. Site located in a flood plain, flooding rare to frequent – Bottomland

1b. Site not as above

2a. Soil saline or sodic ( $EC > 7$  or  $SAR > 12$  within surface 18cm) and seasonal high water table < 150cm from ground surface – Subirrigated Saline Sodic

2b. Seasonal high water table < 100cm from ground surface – Subirrigated

2c. Site not as above

3a. Soil saline or sodic ( $EC > 7$  or  $SAR > 12$  within surface 18cm) – Saline - Sodic

3b. Site not as above

4a. Soil is strongly or violently effervescent ( $CaCO_3 > 14\%$ ) in surface mineral 18cm – Limy

4b. Site not as above

5a. Soil shallow (less than 50cm deep to bedrock, lithic, or paralithic root restrictive layer) – Shallow

5b. Soils moderately deep, deep, or very deep ( $\geq 50$ cm deep to bedrock, lithic, or paralithic root restrictive layer)

6a. Soil ashy or medial textural family – Ashy

6b. Site not as above

7a. Stones and/or boulders cover > 15% surface area or fragmental textural family – Rubbly

7b. Site not as above – Upland

Site potential of tree species with a canopy cover of 25% or greater – B. Forestland

### Part I. Abiotic Groupings

1a. Site located in a flood plain, flooding rare to frequent – Bottomland

1b. Site not as above

2a. Seasonal high water table < 100cm from ground surface – Subirrigated

2b. Site not as above

3a. Soil is strongly or violently effervescent ( $\text{CaCO}_3 > 14\%$ ) in surface mineral 18cm – Limy

3b. Site not as above

4a. Soil shallow (less than 50cm deep to bedrock, lithic, or paralithic root restrictive layer) – Shallow

4b. Soils moderately deep, deep, or very deep ( $\geq 50\text{cm}$  deep to bedrock, lithic, or paralithic root restrictive layer)

5a. Soil ashy or medial textural family – Ashy

5b. Site not as above

6a. Stones and/or boulders cover > 15% surface area or fragmental textural family – Rubbly

6b. Site not as above – Upland

## Part II. Biotic Groupings

### Rangeland Groups

i. Alpine

ii. Bottomland (Riparian)

iii. Grassland

iv. Sagebrush Shrubland

v. Shrubland

### Forestland Groups

i. Aspen Woodland

ii. Cold Woodland

iii. Cool-Moist Woodland

iv. Cool Woodland

v. Warm Woodland