CHAPTER 8

LTA Descriptions

Section M332D Belt Mountains

This Section occurs in central Montana and generally coincides with the Central Montana Island Mountains geomorphic area previously described. Forty five LTAs were mapped in this Section. See Appendix F for a complete list of the LTAs and their acreages. Map unit descriptions are preceded by the following illustrations:

Figure 30: Map showing location of M332D within the Northern Region

Figure 31: Section M332D Moderately and Highly Weathered Granitic Mountains, landscape photograph.
Southwestern Elkhorn Mountains, Helena National Forest

Figure 32: Map showing distribution of LTAS within M332D

Figure 33: Bar chart showing abundance of landform groups within M332D

Figure 34: Bar chart showing abundance of geologic material groups within M332D

LTA10-M332Dj

VALLEYS: RECENT COARSE ALLUVIUM

Location: This LTA is located in the Boulder Mountains, Beaverhead-Deerlodge National Forest, southwest Montana, in the upper Jefferson River Basin.

Acreage by Subsection

10-M332Dj	9,182

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a valley bottom landscape setting, which is typically composed of floodplains and terraces. Parent material is alluvium deposited on a variety of bedrock types.

Accessory Characteristics: The primary soils are deep with cobbly sandy and loamy textures. The vegetation is a mosaic of grassland, shrublands, and coniferous forest. Mean annual precipitation ranges from 36 to 51 centimeters (14 to 20 inches). The elevation range of this LTA is 1677 to 1982 meters (5500 to 6500 feet). The dominant slopes have gradients of 0 to 20 percent. This LTA is slightly dissected by streams, with the dominant stream pattern being NA. Wetlands are a major component of this LTA.

LTA Components: This landtype association consists of floodplains, and terraces.

Floodplains are formed in coarse alluvium. Slope gradients range from 0 to 10 percent. Soils on these landforms are deep, weakly developed, with cobbly sandy and loamy textures. These soils are classified as Typic Cryochrepts and Cryaquolls, and Typic and Aquic Cryochrepts and Cryoborolls. Rock outcrop does not occur on this landscape component. The dominant potential natural vegetation is willow, sedge, spruce, and subalpine fir series. This component represents 60 percent of this LTA.

Terraces are formed in coarse alluvium. Slope gradients range from 0 to 20 percent. Soils on these landforms are deep, weakly developed, with cobbly sandy and loamy textures. These soils are classified as Typic Cryoboralfs, Cryochrepts, and Cryoborolls. Rock outcrop does not occur on this landscape component. The dominant potential natural vegetation is Idaho fescue, sagebrush, Douglas-fir and subalpine fir series. This component represents 40 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest

LTA10-M332D
LTA10-M332C
LTA10-331D

VALLEYS: RECENT COARSE ALLUVIUM

Location: This LTA is located in all mountain ranges of the Lewis and Clark and Helena National Forests.

Acreage by Section

10-M332D	77,706	(Section except for M332Dj)
10-M332C	17,094	
10-331D	982	

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a valley bottom landscape setting which is usually composed of stream terraces, floodplains, and alluvial fans. Parent materials are stratified alluvial deposits of sands, silts and gravels.

Accessory Characteristics: The primary soils are deep gravelly to extremely gravelly sandy loams and loams. The vegetation is a mosaic of deciduous forest, coniferous forest, well drained grassland and wet meadow. Mean annual precipitation ranges from 38 to 75 centimeters (15 to 30 inches). The elevation range of this LTA is 1159 to 1983 meters (3800 to 6500 feet). The dominant slopes are 0 to 4 percent. This LTA by nature has very high stream densities. Wetlands are an important component of this LTA.

LTA Components: This landtype association consists of floodplains, and stream terraces/and alluvial fans.

Floodplains and lower terraces are formed in a variety of stratified alluvium These floodplains have slope gradients that range from 0 to 2 percent. Soils on these landforms are very deep, poorly developed, and consist mainly of sand, gravel and cobble. Silts and clays are found to a lesser extent in oxbow positions and areas historically occupied by beaver dams. The major soils are highly variable and include Fluvents, Aquepts, Aquepts, Aquolls and Borolls. The dominant potential natural vegetation is Englemann spruce and subalpine fir series, with inclusions of black cottonwood. This component represents 60 percent of this LTA.

Higher terraces and included fans are formed in alluvium. These terraces have slope gradients that range from 0 to 4 percent. The alluvial fans often have slope gradients of 8 to 25 percent. Soils on these landforms are deep, poorly to well developed, and consist mainly of gravelly to extremely gravelly sandy loams and loams. Sand, gravel and/or cobble layers or lenses are often present. Areas of silt and clay are present in old oxbow and beaver dam locations as well as glacial ice dams. The major soils are classified as Haploborolls and Cryoborolls. The dominant potential natural vegetation is Douglas-fir, rough fescue, and big sagebrush series. This component represents 40 percent of this LTA.

Compiled by: Richard Saunders, Lewis and Clark National Forest
Revised by Larry Laing, Helena and Lewis and Clark National Forests

LTA12-M332D

VALLEYS:ALLUVIAL FANS,GLACIAL TERRACES
COARSE ALLUVIAL AND GLACIOFLUVIAL DEPOSITS

Location: This LTA is located in foothills near the Boulder, Highland, and Tobacco Root Mountains on the Beaverhead-Deerlodge National Forest in southwest Montana. It occurs in the upper Boulder and Jefferson River basins.

Acreage by Subsection

12-M332D	60,591	(Section except M332Db)

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a valley landscape setting, which is typically composed of alluvial fans and glacial terraces. Parent materials are coarse alluvium and glacial outwash over undifferentiated bedrock.

Accessory Characteristics: The primary soils are deep with cobbly and gravelly sandy and loamy textures. The vegetation is a mosaic of shrublands and grasslands with minor inclusions of coniferous forest. Mean annual precipitation ranges from 23 to 46 centimeters (9 to 18 inches). The elevation range of this LTA is 1373 to 1951 meters (4500 to 6400 feet). The dominant slopes have gradients of 5 to 15 percent. This LTA is moderately to highly dissected by intermittent streams, with the dominant stream pattern being parallel. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of two landform components: alluvial fans and glacial terraces.

Alluvial fans are formed in coarse alluvial and glaciofluvial deposits originating from a variety of bedrock types. The majority of this LTA consists of a series of coalescing alluvial fans. Slope gradients range from 1 to 15 percent. Soils on these landforms are moderately deep to deep,are weakly to moderately developed; and have cobbly and gravelly sandy loam and loam surface soils. The subsurface layers are cobbly sandy loams and loams in the less developed soils and cobbly sandy clay loams and clay loams where subsoil clay accumulation occurs. These soils are classified as Ustochrepts, Argiborolls, and Haploborolls. Rock outcrop occurs on less than 1 percent of this landscape component. The dominant potential natural vegetation is needle-and-thread/bluegrama; bluebunch wheatgrass/blue grama, and sagebrush/bluebunch wheatgrass habitat types. This component represents 95 percent of this LTA.

Glacial terraces are formed in coarse glaciofluvial deposits. This component is represented by one mapping unit at the mouth of Rock Creek in the upper Boulder River. Slope gradients range from 0 to 20 percent. Soils on this landform are deep, weakly to moderately developed; with cobbly sandy and loamy textures. They are classified as Typic Cryochrepts and Cryoboralfs, and Argic and Typic Cryoborolls. Rock outcrop does not occur in this landform component. The dominant potential natural vegetation is a mosiac of Douglas fir/twinflower; dwarf huckleberry/pinegrass; sagebrush/rough fescue or rough fescue/Idaho fescue habitat types. This component represents 5 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest

LTA12-M332Db
LTA12-M331A

VALLEYS: OUTWASH AND OTHER OLDER COARSE ALLUVIAL DEPOSITS

Location: This unit is located mostly in the Beartooth, Madison and southern Gallatin mountain ranges in southwestern Montana with some delineations in the Bridger and Crazy Mountains.

Acreage by Subsection

12-M332Db	8,115
12-M331A	59,997

LTA Setting and General Characteristics

Differentiating Characteristics: This map unit consists of gently sloping glacial outwash plains, alluvial fans, and terraces with some landflows. Parent material is coarse textured glaciofluvial deposits with some mixed loess (wind blown silt) in the soils' surface layer.

Accessory Characteristics: Vegetation is dense lodgepole pine forest, scattered Douglas-fir forest, or mountain grassland. Elevation ranges from 1560 to 2438 meters (5200 to 8000 feet). Mean annual precipitation is 38 to 81 centimeters (15 to 32 inches). Slopes range from 0 to 40 percent.

LTA Components: This LTA has two components depending upon the vegetation.

Where vegetation is grassland, soils are Typic and Aridic Argiborolls with some carbonatic soils such as Typic Cryoborolls, Calcic Cryoborolls, and Ustollic Haplargids. These soils are deep, moderately coarse to medium textured, rocky, and have moderate fertility and water holding capacity. Common potential vegetation is big sagebrush and Idaho fescue series. This component makes up 40 percent of the LTA.

Where vegetation is lodgepole pine forest or Douglas-fir forest, soils are Typic Cryochrepts or Typic Cryoboralfs. These soils are moderately coarse to medium textured, rocky, and have very low to moderate fertility and water holding capacity. A common potential vegetation is lodgepole pine near Hebgen Lake in the Gallatin Range. This component makes up 60 percent of the LTA.

Compiled by: Henry Shovic, Gallatin National Forest and John R. Lane, Custer National Forest

LTA14-M332D

VALLEYS: FINE ALLUVIUM

Location: This LTA is located in the Whitetail Creek valley on the Beaverhead-Deerlodge National Forest in southwest Montana. It occurs in the Upper Jefferson River basin.

Acreage by Section

14-M332D	2,606

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in large valley bottoms which are typically composed of flood plains and terraces. Parent materials are recent alluvium.

Accessory Characteristics: The primary soils are deep with fine textures, some with organic layers on and near the surface. The vegetation is a mosaic of meadows and riparian shrubs, and deciduous tree species. Mean annual precipitation is about 25 cms. (10 inches). The elevation range is 1310 to 1400 meters (4300 to 4600 feet). The dominant slopes have gradients of 0 to 10 percent. This LTA is highly dissected by streams, with the dominant stream pattern being dendritic. Wetlands are a major component of this LTA.

LTA Components: This landtype association consists of two landform components: flood plains and terraces.

Flood plains are formed in variable alluvium, typically finer and/or organic near the surface. Slope gradients vary from 0 to 5 percent. Soils on these landforms are deep, weakly to moderately developed, poorly drained sands and silts, often with organic layers. Dominant soils are classified as Aquolls and Borolls. The potential natural vegetation is a variety of riparian communities and habitat types. This component represents about 50 percent of this LTA.

Terraces are formed in fine alluvium. Slope gradients range from 2 to 10 percent. Soils on this landform are deep, somewhat poorly to well drained, and moderately developed. They are classified as Argiborolls and Ustochrepts. The dominant vegetation is a variety of dry and moist grass and shrub habitat types with significant areas converted to pastures and irrigated hay meadows. This component represents about 50 percent of this unit.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest

LTA20-M332D

BREAKS: METASEDIMENTARY (BELT)

Location: This LTA is located in the Missouri River Basin in the Big Belt, Elkhorn, and Alice Nevada Mountains.

Acreage by Section

20-M332D	13,713

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs in a very steep, deeply eroded or faulted mountainous landscape setting, which is typically composed of structural breaks. Parent materials are colluvium and residuum underlain by metasedimentary (mainly argillite, siltite and quartzite) and volcanic bedrock (basalts and andesites). They are medium textured with high rock contents throughout.

Accessory Characteristics: The primary soils are shallow and moderately deep. The vegetation is a mosaic of coniferous forest and forested scree, with substantial rock outcrops. Mean annual precipitation ranges from 25 to 75 centimeters (10 to 30 inches). The elevation range of this LTA is 1220 to 2288 meters (4000 to 7500 feet). The dominant slopes have gradients of 60 to 90 percent. This LTA is highly to slightly dissected (closely to widely spaced drainages) and weakly or moderately incised by streams, with the dominant stream patterns being dendritic and sub-parallel.

LTA Components: This landtype association consists of structural breaks.

Structural breaks are formed in colluvium and residiuum. Slope gradients range from 60 to 90 percent. Soils on these landforms are shallow and moderately deep, weakly developed and are loams with high amounts of pebbles and channers throughout. These soils are classified as Lithic Ustochrepts, and Lithic and Typic Cryochrepts. Rock outcrop occurs on about 30 percent of this landscape component. The dominant potential natural vegetation series are Douglas-fir, subalpine fir, and limber pine on warmer aspects with subalpine fir and Douglas-fir on more northerly aspects. This component represents 100 percent of this LTA.

Compiled by: Larry Laing. Helena National Forest

LTA21-M332D
LTA21-M332E

BREAKS: HIGHLY WEATHERED GRANITICS

Location: This LTA is located in the Anaconda-Pintlar, Fleecer, Pioneer, Boulder, Bull, Highland, and Tobacco Root Mountains on the Beaverhead /Deerlodge National Forest in the Jefferson and Madison River Basins in southwest Montana.

Acreage by Section

21-M332D	8,423
21-M332E	41,402

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in steep, deeply eroded (rejuvenated), or faulted mountainous landscape settings which is typically composed of structural and stream breaks. Parent materials are colluvium and residuum derived from moderately to highly weathered Cretaceous to Tertiary intrusive rocks undifferentiated, consisting mainly of granite, quartz monzonite, and granodiorite.

Accessory Characteristics: The primary soils are shallow to moderately deep, well drained, gravelly sandy loams. The vegetation is a mosaic of coniferous forest and mountain grasslands. Mean annual precipitation ranges from 41 to 102 centimeters (16 to 40 inches). The elevation range of this LTA is 2012 to 3048 meters (6600 to 10000 feet). The dominant slopes have gradients of 40 to 75 percent. This LTA is highly to moderately dissected by streams, with the dominant stream pattern being dendritic to parallel.

LTA Components: This landtype association consists of breaks.

Breaks are formed in colluvium and residuum. Slope gradients range from 40 to 75 percent. Soils on these landforms are shallow to moderately deep, weakly developed, well drained, channery sandy loams and loams. These soils are classified as Typic Cryorthents, and Lithic and Typic Cryochrepts. Rock outcrop accounts for up to a quarter of this landscape component. The dominant potential natural vegetation is Douglas-fir, big sagebrush, subalpine fir and whitebark pine series. This component represents 100 percent of this LTA.

Compiled by: Dan Svoboda and Dave Ruppert, Beaverhead-DeerLodge National Forest

LTA24-M332D

BREAKS: VOLCANICS

Location: This LTA is located in the Boulder Mountains of southwest Montana in the Jefferson River basin. It occurs mostly on the Beaverhead-Deerlodge National Forest.

Acreage by Section

24-M332D	4,485

LTA Setting and General Characteristics

Differentiating characteristics: This LTA occurs in a mountain landscape setting, which is typically composed of stream breaks. Parent materials are residuum underlain by volcanic bedrock.

Accessory characteristics: The primary soils are shallow and moderately deep with cobbly loamy textures. The vegetation is a mosaic of grasslands, shrublands, coniferous forest, and rock. Mean annual precipitation ranges from 41 to 51 centimeters (16 to 20 inches). The elevation range of this LTA is 1677 to 2134 meters (5500 to 7000 feet). The dominant slopes have gradients of 45 to 80 percent. This LTA is moderately dissected by streams, with the dominant stream pattern being parallel. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of stream breaks.

Stream breaks are formed in volcanic bedrock. Slope gradients range from 45 to 80 percent. Soils on these landforms are shallow and moderately deep, weakly developed, and have cobbly loamy textures. These soils are classified as Typic and Lithic Cryochrepts and Cryorthents. Rock outcrop occurs on about 30 percent of this landscape component. The dominant potential natural vegetation is forested scree, Idaho fescue, sagebrush, and Douglas-fir series. This component represents 100 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest

LTA25-M332D
LTA25-M331A

BREAKS: SANDSTONES AND SHALES

Location: This unit is located in the Beartooth, Bridger, Crazy, Gallatin and Madison mountain ranges in southwestern Montana.

Acreage by Section

25-M332D	20,570
25-M331A	69,798

LTA Setting and General Characteristics

Differentiating Characteristics: This map unit consists of steep to moderately steep ridges and slopes whose shape is controlled by underlying bedrock structure. Soil parent material is colluvium and residuum derived from thickly interbedded limestone, sandstone, and shale.

Accessory Characteristics: Vegetation is sparse to dense forest with some meadows and grassland. Elevation ranges from 1830 to 2640 meters (6000 to 8800 feet). Mean annual precipitation is 58 to 127 cms. (23 to 50 inches). Slopes are greater than 40 percent.

LTA Components: This landtype association consists of two components.

Where vegetation is sparse Douglas-fir forest and grasslands, soils are Argic Cryoborolls, and Mollic Cryoboralfs. These soils are medium to moderately fine textured, rocky or non-rocky, with moderate to high fertility and water holding capacity. Where bedrock is limestone, soils are Lithic and Typic Calciborolls, and Calcic Cryoborolls. Rock outcrop makes up 10 to 25 percent of this component. Common potential vegetation includes Douglas-fir, Idaho fescue, and big sagebrush series. This component makes up 50 percent of this LTA.

Where vegetation is dense forest and meadows, soils are Mollic and Typic Cryoboralfs, Typic Cryochrepts, and Argic Cryoborolls. These soils are medium to moderately fine textured, rocky or non-rocky, and have moderate fertility and water holding capacity. Rock outcrop makes up 10 to 25 percent of this component. Common potential vegetation includes Douglas-fir, subalpine fir, Idaho fescue and subalpine fir-whitebark pine series. This component makes up 50 percent of this LTA.

Compiled by: Henry Shovic, Gallatin National Forest and John R. Lane, Custer National Forest

LTA27-M332D

BREAKS: CARBONATES

Location: This LTA is located in the Big Belt, Little Belt, and Snowy Mountains in the Missouri River basin.

Acreage by Section

27-M332D	235,563

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs in a very steep, deeply eroded or faulted mountainous landscape setting, which is typically composed of structural breaks. Parent materials are colluvium and residuum underlain by limestone.

Accessory Characteristics: The primary soils are moderately deep or deeper. They are medium textured with high rock contents throughout. The vegetation is a mosaic of coniferous forest and forested scree, with substantial rock outcrops. Mean annual precipitation ranges from 25 to 75 centimeters (10 to 30 inches). The elevation range of this LTA is 1159 to 2288 meters (3800 to 7500 feet). The dominant slopes have gradients of 60 to 90 percent. This LTA is highly to slightly dissected (closely to widely spaced drainages) and weakly or moderately incised by streams, with the dominant stream patterns being subparallel.

LTA Components: This landtype association consists of structural breaks.

Structural breaks are formed in colluvium and residiuum. Slope gradients range from 60 to 90 percent. Soils on these landforms are mostly moderately deep or deeper to bedrock, weakly developed and are loams dominated by gravel size rock fragments throughout. These soils are classified as Typic Ustochrepts and Typic Cryochrepts. Rock outcrop and associated talus occurs on about 40 to 50 percent or more over much of this landscape component. The amount of rock outcrop and scree is around 20 percent or less. The dominant potential natural vegetation is Douglas-fir series on higher energy aspects and subalpine fir and spruce series on more northerly aspects. Forested and nonforested scree occur throughout. This component represents 100 percent of this LTA.

Compiled by: Larry Laing, Helena National Forest

LTA34-M332Dj
LTA34-M332De

HIGH RELIEF MOUNTAIN SLOPES: VOLCANICS

Location: This LTA is located in the Blackfoot River Drainage.

Acreage by Subsection

34-M332Dj	2,786
34-M332De	10,644

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountainous landscape setting which is typically composed of steep mountain slopes. Parent material is colluvium and residuum underlain by weakly weathered andesite and other volcanic rocks. In some areas the parent material is influenced by a complex of volcanic and metasedimentary Belt Series rocks.

Accessory Characteristics: The primary soils are moderately deep or deeper and are medium to moderately fine textured. The vegetation is coniferous forest. Mean annual precipitation ranges from 50 to 75 centimeters (20 to 30 inches). The elevation range of this LTA is 1464 to 2135 meters (4800 to 7000 feet). The dominant slopes have gradients of 25 to 60 percent. This LTA is moderately dissected (moderately to widely spaced drainages) and deeply incised by streams, with the dominant stream pattern being dendritic. Small wetlands are sometimes associated with slumpy areas.

LTA Components: This landtype association consists of steep, mountain slopes.

Steep mountain slopes are mostly formed in andesite and other volcanic rock. In some areas they are influenced by a complex of volcanic and metasedimentary Belt Series rocks. Slope gradients range from 25 to 60 percent. Soils on these landforms are moderately deep to very deep, moderately developed, and have very gravelly or gravelly loam, cobbly loam and stony loam surfaces. Subsurface textures include very and extremely stony clay loam, very and extremely cobbly loams, very gravelly clay loam and extremely gravelly loam. These soils are classified as Typic Cryoboralfs, Typic Eutroboralfs and Typic Agriborolls. Rock outcrop occurs on less than 5 percent of this landscape component. Small landslides are associated with basaltic and andesitic dikes and sills or local ash/tuff deposits. The dominant potential natural vegetation is Douglas-fir and subalpine fir series. This component represents 100 percent of this LTA.

Compiled by: Larry Laing, Helena National Forest

LTA34-M332Db
LTA34-M332C
LTA34-331D

HIGH RELIEF MOUNTAIN SLOPES: VOLCANICS

Location: This LTA is located in the Highwood, Little Belt, and Crazy Mountains.

Acreage by Section

34-M332Db	1,277
34-M332C	233
34-331D	6,622

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs on very steep mountain slopes composed of convex ridges and shoulders in complex with smooth surfaces. Parent material is sandstone, granite, and basalt.

Accessory Characteristics: The primary soil is shallow to moderately deep very gravelly or stony loam or sandy loam. The vegetation is coniferous forest. Mean annual precipitation ranges from 46 to 76 centimeters (18 to 30 inches). The elevation range is 1830 to 2288 meters (6,000 to 7,500 feet). The dominant slopes have gradients of greater than 60 percent. This LTA is slightly dissected by streams with the dominant stream pattern being dendritic. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of very steep mountain slopes.

These mountain slopes are formed in sandstone, granite and basalt. Slope gradient is greater than 60 percent. Soil on this landform is shallow to moderately deep, weakly developed and consists mainly of very gravelly or stony colluvial material. These soils are classified as Typic Cryochrepts. Typically 10 to 25 percent of this association consists of rock outcrop. The dominant potential vegetation is subalpine fir series with some scree. This component represents the entirety of this LTA.

Compiled by: Rich Saunders, Lewis and Clark National Forest
Revised by Larry Laing, Helena/Lewis and Clark National Forests

LTA36-M332D
LTA36-M332C
LTA36-331D

HIGH RELIEF MOUNTAIN SLOPES: SANDSTONES AND SHALES

Location: This LTA is located throughout the Lewis and Clark National Forest except in the Little Snowy Mountains.

Acreage by Section

36-M332D	12,477
36-M332C	13,447
36-331D	764

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs on very steep unglaciated mountain slopes typically composed of convex ridges and shoulders in complex with smooth surfaces. Parent materials are non-carbonate and sedimentary.

Accessory Characteristics: The primary soils are shallow to moderately deep extremely gravelly loams. The vegetation is coniferous forest. Mean annual precipitation ranges from 51 to 102 centimeters (20 to 40 inches). The elevation range of this LTA is 1829 to 2743 meters (6000 to 9000 feet). The dominant slopes have gradients of greater than 60 percent. This LTA is slightly dissected by streams with the dominant stream pattern being radial. Wetlands and lakes are virtually non-existent in this LTA.

LTA Components: This landtype association consists of convex ridges, and shoulders in complex with smooth surfaces. All of these landforms occur on non-carbonate sedimentary parent material.

The convex ridges and shoulders have slope gradient of 25 to greater than 60 percent. Soils on these landforms are shallow to moderately deep, poorly developed, and consist mainly of extremely gravelly sandy loam. The major soils are classified as Typic Cryochrepts. Rock outcrop and talus occur on 75 percent of this unit. The dominant potential natural vegetation series is subalpine fir-whitebark pine.

Compiled by: Richard Saunders, Lewis and Clark National Forest

LTA37-M332D

HIGH RELIEF MOUNTAIN SLOPES: CARBONATES

Location: This LTA is located in the Big Belt, Dry Range and South Elkhorn Mountains, part of the Missouri River basin.

Acreage by Section

37-M332D	46,970

LTA Settings and General Characteristics:

Differentiating Characteristics: This LTA occurs in a mountainous landscape setting, which is typically composed of mountain slopes and dipslopes. Parent materials are colluvium and residuum underlain by limestone sometimes associated with calcareous shales.

Accessory Characteristics: The primary soils are moderately deep and shallow and have medium textured surfaces. The vegetation is coniferous forest with inclusions of mountain grassland. Mean annual precipitation ranges from 38 to 76 centimeters (15 to 30 inches). The elevation range of this LTA is 1068 to 2196 meters (3500 to 7200 feet). The dominant slopes have gradients of 40 to 60 percent. This LTA is highly to slightly (widely to closely spaced drainages) and has weakly to deeply incised drainages. The dominant stream patterns are dendritic and subparallel.

LTA Components: This landtype association consists of mountain slopes, and dipslopes.

Mountain slopes are formed in colluvium and residuum from limestone sometimes with included calcareous shales and argillites. Slope gradients range from 40 to 60 percent. Soils on these landforms are moderately deep and shallow and weakly developed, although some soils have thick dark surface layers. Surface textures are very gravelly loams and gravelly, very gravelly and extremely gravelly silt loams. Subsurface layers have extremely gravelly loam, extremely gravelly silt loam, very gravelly silt loam, very gravelly loam and very, gravelly silty clay loam textures. These soils are classified as Typic and Lithic Ustochrepts, Typic Cryochrepts, Typic Calciborolls, Calcic Cryoborolls and Lithic Ustochrepts. Rock outcrop occurs on about 10 percent of this landscape component. The dominant potential natural vegetation series is Douglas-fir with ponderosa pine at lower elevations on some steep southerly aspects. Subalpine fir and spruce can occur on northerly aspects at higher elevations. This component represents 76 percent of this LTA.

Dip slopes are formed in colluvium and residuum formed in limestone and calcareous sandstone. Slope gradients range from 40 to 60 percent. Soils on these landforms are moderately deep and shallow and are weakly developed. Surface soils have extremely gravelly silt loam and gravelly silty clay loam textures. The subsurface layers are typically very gravelly silty clay loam and very gravelly silt loam. These soils are classified as Typic and Lithic Cryochrepts. Rock outcrop occurs on about 30 percent of this landscape component. The dominant potential natural vegetation series is Douglas-fir. This component represents 24 percent of this LTA.

Compiled by: Larry Laing, Helena National Forest

LTA39-M332D

STEEP GLACIATED MOUNTAIN SLOPES: GNEISSES AND SCHISTS

Location: This LTA is located in the Little Belt Mountains of the Lewis and Clark National Forest in west-central Montana in the Missouri River Basin.

Acreage by Section

39-M332D	5,300

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a steep mountain landscape setting, which is typically composed of rockland and scree. Parent materials are residuum underlain by gneiss and schist bedrock.

Accessory Characteristics: Soils are weakly developed in very stoney colluvium. Active movement of loose rock is common. The vegetation is a mosaic of rock outcrop, scree, and coniferous forest. Mean annual precipitation ranges from 64 to 89 centimeters (25 to 35 inches). The elevation range of this LTA is 1829 to 2286 meters (6000 to 7500 feet). The dominant slopes have gradients over 60 percent. This LTA is moderately dissected by streams, with the dominant stream pattern being parallel. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of steep mountain slopes.

Mountain slopes are formed in gneiss and schist bedrock. Slope gradients range from 60 to 100 percent. Soils on these landforms are shallow and moderately deep, weakly developed, with stoney textures. These soils are classified as Typic Cryochrepts. Rock outcrop and scree occur on 40 to 90 percent of this landscape component. The dominant potential natural vegetation is subalpine fir and scree. This component represents 100 percent of this LTA.

Compiled by: Robin Strathy, Lewis and Clark National Forest.

LTA40-M332D

STEEP GLACIATED MOUNTAIN SLOPES: METASEDIMENTARY (BELT)

Location: This unit is located in the Big Belt Mountains of the Upper Missouri River Basin of west central Montana.

Acreage by Section

40-M332D	7,828

LTA Setting and General Characteristics

Differentiating Characteristics: This map unit occurs in a steep, alpine glaciated landscape setting. Parent materials are metasediments composed of argillites, siltites and quartzites with alpine glacial till scattered throughout, which is typically medium textured.

Accessory Characteristics: The primary soils are shallow to moderately deep. They are moderately coarse to medium textured. The vegetation is a mosaic of coniferous forest, avalanche chutes, and rock outcrops. Mean annual precipitation ranges from 50 to 113 centimeters (20 to 45 inches). The elevation range of this unit is 1846 to 2923 meters (6000 to 9500 feet). The dominant slopes have gradients greater than 60 percent. This map unit is moderately to highly dissected by streams, with the dominant stream pattern being parallel. Wet sidehill areas are a major component of this unit.

LTA Components: This landtype association consists of steep glaciated mountain slopes.

Steep glaciated mountain slopes are formed in metasediments that consist of argillites, siltites and quartzites. The primary landforms include glacial cirque basins and headwalls and glacial trough walls. They have been strongly scoured and often contain shallow soils and rock outcrops. The lower slopes can have glacial till depositions. Slopes range from 25 to 100 percent, but the dominant slopes are greater than 60 percent. The major soils are classified as Andic Cryochrepts in the cirque basins. The dominant potential natural vegetation in the cirques is subalpine fir and whitebark pine /subalpine fir habitat types. The major soils associated with the glacial trough walls include Typic Ustochrepts, Andic Cryochrepts and Typic Cryoboralfs. Rock outcrops also occur. The dominant potential natural vegetation on the trough walls is Douglas-fir and subalpine fir series as well as forested scree. The soils and vegetation associated with these extremely steep slopes are strongly controlled by aspect.

Compiled by: Larry Laing, Helena National Forest

LTA41-M332Dc
LTA41-M331A

STEEP GLACIATED MOUNTAIN SLOPES: GRANITICS

Location: This unit is located in the Gallatin and Crazy mountain ranges in southwestern Montana.

Acreage by Section

41-M332Dc	72,095
41-M331A	117,173

LTA Setting and General Characteristics

Differentiating Characteristics: This map unit consists of steep glacial troughwalls with weak stream dissection. Included are some talus slopes and rock glaciers. Soil parent material is colluvium and glacial till derived from coarse grained, shallow intrusive rocks.

Accessory Characteristics: Vegetation is sparse to dense upper subalpine, lower subalpine, or Douglas-fir forest. Slopes are greater than 40 percent. Elevation ranges from 1768 to 2743 meters (5800 to 9000 feet). Mean annual precipitation is 63 to greater than 125 centimeters (25 to greater than 50 inches).

LTA Components: This LTA has two components:

Soils where vegetation is either Douglas-fir or lower subalpine forest are Udic Ustochrepts or Dystric Cryochrepts. These soils are deep, moderately coarse to coarse textured, rocky, and have low fertility and water holding capacity. Rock outcrop makes up 20 to 30 percent of this component. Common potential vegetation includes the subalpine fir and Douglas-fir series. This component makes up 35 percent of this LTA.

Soils where vegetation is sparse upper subalpine forest or nearly absent are Cryochrepts. They are deep to shallow, and generally coarse textured with very low fertility and water holding capacity. Rock outcrop makes up 50 to 90 percent of this component. Where forested, a common potential vegetation is the subalpine fir-whitebark pine series. This component makes up 65 percent of this LTA.

Compiled by: Henry Shovic, Gallatin National Forest

LTA41-M332D

STEEP GLACIATED MOUNTAIN SLOPES: GRANITIC

Location: This LTA is located in the Big Belt Mountains, the upper Ten Mile Creek drainage and the Elkhorn Mountains.

Acreage by Section

41-M332D	28,251 (Section except M332Dc)

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs in an alpine glaciated mountainous landscape setting which is typically composed of glacial trough walls. Parent material is glacial till underlain by weakly weathered granite, granite-diorite and diorites. Northerly aspects have volcanic ash influenced surface soils.

Accessory Characteristics: The primary soils are deep and moderately coarse textured. The vegetation is a mosaic of coniferous forest and forested scree Mean annual precipitation ranges from 50 to 100 centimeters (20 to 40 inches). The elevation range of this LTA is 1678 to 2501 meters (5500 to 8200 feet). The dominant slopes have gradients of 60 to 90 percent. This LTA is highly dissected (closely spaced drainages) and weakly incised by streams, with the dominant stream pattern being parallel.

LTA Components: This landtype association consists of glacial trough walls.

Glacial trough walls are formed in weakly weathered granite or granitelike rock. Slope gradients range from 60 to 90 percent. Soils on these landforms are deep, weakly developed, and have sandy loam or loam surfaces and very to extremely gravelly sandy loam subsurface. These soils are classified as Typic Ustochrepts and Typic Cryochrepts. Rock outcrop occurs on about 40 percent of this landscape component. The dominant potential natural vegetation series is Douglas-fir with subalpine fir on some north facing slopes. This component represents 100 percent of this LTA.

Compiled by: Larry Laing, Helena National Forest

LTA42-M332D

STEEP GLACIATED MOUNTAIN SLOPES: VOLCANICS

Location: This LTA is located in the Elkhorn Mountains in southwest Montana.

Acreage by Section

42-M332D	23,865

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a glaciated mountain landscape setting, which is typically composed of cirques. Parent materials are residuum underlain by volcanic bedrock.

Accessory Characteristics: The primary soils are shallow and moderately deep with cobbly loamy textures. The vegetation is a mosaic of coniferous forest and rock. Mean annual precipitation ranges from 64 to 76 centimeters (25 to 30 inches). The elevation range of this LTA is 2134 to 2896 meters (7000 to 9500 feet). The dominant slopes have gradients of 60 to 100 percent. This LTA is moderately dissected by streams, with the dominant stream pattern being parallel. Wetlands are a major component of this LTA.

LTA Components: This landtype association consists of cirques.

Cirques are formed in volcanic bedrock. Slope gradients range from 60 to 100 percent. Soils on these landforms are shallow and moderately deep, weakly developed, with cobbly loamy textures. These soils are classified as Cryorthents and Cryochrepts. Rock outcrop occurs on about 50 to 90 percent of this landscape component. The dominant potential natural vegetation is subalpine fir series. This component represents 100 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest

LTA43-M332D
LTA43-M332C
LTA43-M333C
LTA43-331D

STEEP GLACIATED MOUNTAIN SLOPES: CARBONATES

Location: This LTA is located mostly on the Rocky Mountain Front and in adjacent areas.

Acreage by Section

43-M332D	12,878
43-M332C	158,089
43-M333C	235
43-331D	625

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occupies high elevation landscapes where alpine glaciation has occurred. It is typically occupied by fault escarpments (especially in M332C), cirques, troughwalls, and ridges. The parent material is limestone.

Accessory Characteristics: The primary soils are Lithic Cryorthents and Cryochrepts. The vegetation is coniferous forest. Mean annual precipitation ranges from 76 to 127 centimeters (30 to 50 inches). The elevation range of this LTA is 1524 to 2438 meters (5000 to 8000 feet). The dominant slope gradients are 70 to 90 percent. This LTA is moderately dissected by streams and the dominant drainage pattern is dendritic. Wetlands, lakes, and ponds are a minor component of this LTA.

LTA Components: This landtype association consists of steep west facing slopes, very steep glacial breaks, and rockland/scree on fault escarpments.

The steep west facing slopes are formed in limestone. These slopes have gradient ranging from 40 to 60 percent. Soils on these landscapes are shallow, poorly developed, and consist mainly of loam and flaggy gravel. These soils are classified as Lithic Cryorthents. Rock outcrop occurs on less than 15 percent of this landscape component. The dominant potential vegetation series are open growing wind deformed Douglas-fir, limber pine, and spruce on scree. This component represents 30 percent of this LTA.

The very steep glacial breaks are formed in limestone. Slope gradients are mainly greater than 60 percent. The soil on this landscape is deep, poorly developed, and consist mainly of sandy loam and gravel. These soils are classified as Typic Cryochrepts. Rock outcrop and talus occur on seventy-five percent of this landscape component. The dominant potential natural vegetation series is Douglas-fir. This component represents 30 percent of this LTA.

The rockland/scree component of this LTA occur on fault escarpments in limestone. Slopes are mainly greater than 60 percent. Soil on this landscape consists of sandy loam, loamy sand, gravel, and cobble. These materials are classified as scree. The dominant potential vegetation is subalpine fir-whitebark pine. This component represents 40 percent of this LTA.

Compiled by: Richard Saunders and Robin Strathy, Lewis and Clark National Forest

LTA44-M332D
LTA44-M332C
LTA44-331D

STEEP GLACIATED MOUNTAIN SLOPES: SANDSTONES AND SHALES

Location: This LTA is extensive throughout the Rocky Mountain Division on the Lewis and Clark Forest and in the Elkhorn Mountains on the Beaverhead-Deerlodge Forest.

Acreage by Section

44-M332D	15,947
44-M332C	101,583
44-331D	98

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occupies high elevation landscapes where alpine glaciation has occurred. It is typically composed of glacial cirque headwalls, and rockland and scree on fault escarpments in Section M332C, and glacial cirques in Section M332D. The parent material is sandstone and/or shale.

Accessory Characteristics: The primary soils are deep extremely cobbly sandy loams and loams. The vegetation is coniferous forest. Mean annual precipitation ranges from 63 to 88 centimeters (25 to 35 inches). The elevation range of this LTA is 1500 to 2896 meters (5000 to 9000 feet). The dominant slopes have gradients of 40 to greater than 60 percent. This landtype is moderately dissected by streams, with the dominant stream pattern being parallel. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of glacial cirques, rockland, and scree on fault escarpments.

Glacial cirques are formed in sandstone and shale. Soils on these landforms are from very shallow to moderately deep, poorly developed, and consist mainly of sandy loam and angular cobble. The major soils are classified as Typic, Andic and Lithic Cryochrepts. Rock outcrop occurs on 5 to 15 percent of this landscape component. The dominant potential natural vegetation is subalpine fir and whitebark pine series. This component represents 60 percent of this unit.

Rockland occurs on a variety of non-carbonate rocks. This component is a miscellaneous landtype and is classified as a scree habitat type. It does support some alpine fir and whitebark pine. This component represents 25 percent of this LTA.

Compiled by: Richard Saunders and Robin Strathy, Lewis and Clark National Forest, and Dave Ruppert, Beaverhead-Deerlodge National Forest

LTA50-M332D

GLACIATED MOUNTAIN SLOPES: METASEDIMENTARY (BELT)

Location: This unit is located in the Big Belt Mountains of the Upper Missouri River basin of west central Montana.

Acreage by Section

50-M332D	5,840

LTA Setting and General Characteristics

Differentiating Characteristics: This map unit occurs on gently to moderately sloping glacial landscape settings. Parent materials are undifferentiated glacial drift composed of argillites, siltites and quartzites. Small areas of residual materials and rock outcrop are also included. They are medium textured.

Accessory Characteristics: The primary soils are deep, moderately coarse to medium textured. The vegetation is, typically, a mosaic of coniferous forest with some wetlands. Mean annual precipitation ranges from 50 to 88 centimeters (20 to 35 inches). The elevation range of this unit is 1846 to 2461 meters (6000 to 8000 feet). The dominant slopes range from 10 to 40 percent. This map unit is slightly dissected by streams, with the dominant stream patterns being deranged and dendritic. Wetlands, seeps, bogs and riparian zones are common components of this unit.

LTA Components: This landtype association consists of gently to moderately sloping glacial moraines and glaciated mountain slopes.

Gently to moderately sloping glacial moraines are formed in the undifferentiated belt materials, both till and outwash. The moderately sloping glaciated mountain topography is covered with till. These areas have slopes that range from 10 to 40 percent. They have moderately coarse to medium textured materials. The major soils are classified as Typic Cryochrepts and Typic Cryoboralfs. They often have volcanic ash influence at higher elevations. The dominant potential natural vegetation is subalpine fir and Douglas-fir.

Compiled by: Larry Laing, Helena National Forest

LTA51-M332Dh
LTA51-M332Dj

GLACIATED MOUNTAIN SLOPES: GRANITICS

Location: This LTA is located in the Boulder, Big Belt, and Elkhorn Mountains; Beverhead-Deerlodge and Helena National Forests, southwest Montana, in the upper Jefferson and Missouri River Basins.

Acreage by Subsection

51-M332Dh	10,705
51-M332Dj	45,854

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a glaciated mountain landscape setting, which is typically composed of glaciated mountain slopes, ridges, and moraines. Parent materials are residuum and granitic glacial moraine underlain by weathered granitic bedrock. The surface mineral horizon is often influenced by wind blown volcanic ash.

Accessory Characteristics: The primary soils are shallow, moderately deep, and deep with gravelly, cobbly and bouldery; sandy and loamy textures. The vegetation is a mosaic of meadows and coniferous forest. Mean annual precipitation ranges from 41 to 76 centimeters (16 to 30 inches). The elevation range of this LTA is 1678 to 2591 meters (5500 to 8500 feet). The dominant slopes have gradients of 20 to 50 percent. This LTA is highly dissected by streams. The dominant stream pattern is rectangular with a deranged pattern locally in glacial moraines. Wetlands are a major component of this LTA.

LTA Components: This landtype association consists of glaciated mountain slopes and ridges, and glacial moraines.

Glaciated mountain slopes and ridges are formed in weathered granitic bedrock. Slope gradients range from 10 to 50 percent. Soils on these landforms are shallow and moderately deep, weakly developed, with gravelly sandy and loamy textures. These soils are classified as Typic and Lithic Cryochrepts and Cryorthents with local areas of Typic Cryoboralfs. Rock outcrop occurs on about 25 percent of this landscape component. The dominant potential natural vegetation is subalpine fir series. This component represents 50 percent of this LTA.

Moraines are formed in granitic glacial deposits. Slope gradients range from 0 to 35 percent. Soils on these landforms are deep, moderately developed, with cobbly and bouldery loamy textures. Some areas have a surface mineral layer with wind blown volcanic ash influence. These soils are classified as Typic and Aquic Cryochrepts and Cryoboralfs. Rock outcrop is not associated with this landscape component. The dominant potential natural vegetation is Douglas-fir and subalpine fir series. Small meadows scattered throughout the area contain Typic and Aquic Cryoborolls, and Typic Cryaquolls with willow, sedge and hairgrass series. The moraine component represents 50 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest and Larry Laing, Helena National Forest.

LTA51-M332D
LTA51-M332E
LTA51-M331A

GLACIATED MOUNTAIN SLOPES: HARD INTRUSIVE ROCKS

Location: This unit is located in the Gallatin, Madison, Crazy and Absaroka-Beartooth mountain ranges in southwestern Montana.

Acreage by Section

51-M332D	42,250	(Section except M332Dh,M332Dj)
51-M332E	125,884	
51-M331A	760	

LTA Setting and General Characteristics

Differentiating Characteristics: This map unit consists of gently to moderately steep glacial moraine. Soil parent material is glacial till derived from coarse grained, shallow intrusive rocks.

Accessory Characteristics: Vegetation is sparse to dense upper to lower subalpine forest, Douglas-fir forest, or mountain grassland. Elevation ranges from 1981 to 2743 meters (6500 to 9000 feet). Mean annual precipitation is from 50 to over 125 centimeters (20 to greater than 50 inches). Slope gradient ranges from 0 to 40 percent.

LTA Components: This landtype association consists of three components.

Where vegetation is grassland, soils are Typic Cryoborolls and Argic Cryoborolls. These soils are deep, moderately coarse to medium textured, rocky, and have moderate fertility and water holding capacity. Rock outcrop makes up five percent of this component. Common potential natural vegetation is big sagebrush and Douglas-fir series. This component makes up 15 percent of the LTA.

Where vegetation is lower subalpine forest with some Douglas-fir forest, soils are Typic Cryochrepts. These soils are moderately coarse texture, rock, and have low fertility and water holding capacity. Rock outcrop makes up 10 percent of this component. Common potential natural vegetation is subalpine fir with some Douglas-fir. This component makes up 50 percent of the LTA.

Where vegetation is upper subalpine forest, soils are Cryochrepts intermixed with some Cryumbrepts. These soils are deep to moderately shallow, rocky, and have low fertility and water holding capacity. Rock outcrop makes up 20 to 40 percent of this component. Common potential natural vegetation includes subalpine fir, spruce and Idaho fescue series. This component makes up 35 percent of the LTA.

Compiled by: Henry Shovic, Gallatin National Forest

LTA53-M332D
LTA53-M332C

GLACIATED MOUNTAIN SLOPES: SANDSTONES AND SHALES

Location: This LTA is located throughout the Lewis and Clark Forest.

Acreage by Section

53-M332D	10,191
53-M332C	165,005

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs on an alpine glacial till landform which is typically composed of outwash benches, drift plastered trough walls, and hilly valley bottoms. Parent materials are sandstones and shales.

Accessory Characteristics: The primary soils are deep, very cobbly loams. The vegetation is subalpine forest. Mean annual precipitation ranges from 63 to 88 centimeters (25 to 35 inches). The elevation range of this LTA is 1524 to 1981 meters (5000 to 6500 feet). The dominant slopes have gradients of 10 to 40 percent. This landtype is moderately dissected by streams with the dominant stream pattern being parallel. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of clayey glacial drift deposits, drift plastered trough walls, hilly valley bottoms, and hilly glaciated valleys.

The clayey glacial drift deposits are formed mainly in sandstone and shale material. Slope gradients range from 25 to 40 percent. The soils on these landforms are deep, weakly developed, loamy-skeletal loams. These soils are classified as Typic Cryochrepts. Rock outcrop occurs on about 10 percent of this landscape. The dominant potential natural vegetation series is subalpine fir.

The drift plastered trough walls are formed mainly in sandstone and shale material. Slope gradients range from 25 to 40 percent. The soils on these landforms are deep, weakly developed, and loamy-skeletal. These soils are classified as Typic Cryochrepts. Rock outcrop occurs on about 10 percent of this landscape. The dominant potential natural vegetation series is Douglas-fir.

The hilly valley bottoms are formed mainly in sandstone and shale. Slope gradients range from 10 to 25 percent. The soils on these landforms are moderately deep, weakly developed, and loamy-skeletal. These soils are classified as Andic Cryochrepts. Rock outcrop occurs on about 15 percent of this landscape. The dominant natural vegetation series is Douglas-fir.

The hilly glaciated valleys are formed mainly in sandstone and shale. Slope gradients range from 10 to 25 percent. The soils on these landforms are moderately deep, weakly developed, clay loams with 35 to 50 percent gravel. These soils are classified as Argic Cryoborolls. Rock outcrop occurs on less than 5 percent of this LTA. The dominant natural vegetation series is rough fescue.

Compiled by: Richard Saunders, Lewis and Clark National Forest

LTA54-M332D
LTA54-M332E

GLACIATED MOUNTAIN SLOPES: VOLCANICS

Location: This LTA is located in southwest Montana in the Boulder Mountains in the upper Jefferson River and upper Clark Fork River basins. It occurs on the Beaverhead-Deerlodge National Forest and the Helena National Forest.

Acreage by Subsection

54-M332D	45,449
54-M332E	31,160

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a glaciated mountain landscape setting, which is typically composed of glaciated mountain slopes and moraines. Parent materials are glacial deposits and residuum underlain by volcanic bedrock.

Accessory Characteristics: The primary soils range from very deep to shallow to bedrock. They are loamy with high cobble contents especially in the subsurface layers. The vegetation is a mosaic of coniferous forest and wet meadows with the forest dominating. Mean annual precipitation ranges from 41 to 76 centimeters (16 to 30 inches). The elevation range of this LTA is 1677 to 2591 meters (5500 to 8500 feet). The dominant slopes have gradients of 10 to 50 percent. This LTA is highly dissected by streams, with the dominant stream patterns being parallel or dendritic on sideslopes with a deranged pattern locally in glacial moraines. Wetlands are a major component of this LTA.

LTA Components: This landtype association consists of moraines and glaciated mountain slopes.

Moraines are formed in volcanic glacial deposits. Volcanic ash effected loess deposits often influence surface soil characteristics. Slope gradients range from 0 to 35 percent. Soils on these landforms are very deep, moderately developed, with cobbly loam, very cobbly loam and clay loam surface textures. Very cobbly loams typify subsurface textures. These soils are classified as Typic and Aquic Cryochrepts and Cryoboralfs. Rock outcrop does not occur in this landscape component. The dominant potential natural vegetation is Douglas-fir and subalpine fir series. Meadows in this component have soils classified as Typic and Aquic Cryoborolls, and Typic Cryaquolls with willow, sedge, and tufted hairgrass series. This component represents 70 percent of this LTA.

Glaciated mountain slopes are formed in volcanic bedrock. Volcanic ash affected loess deposits often influence surface soil characteristics. Slope gradients range from 20 to 50 percent. Soils on these landforms are typically shallow to moderately deep, weakly to moderately developed with cobbly loam or loam surface textures. The subsurface layers are very or extremelycobbly loams. These soils are classified as Typic and Lithic Cryochrepts and Typic Cryoboralfs. Rock outcrop occurs on about 20 percent of this landscape component. The dominant potential natural vegetation is subalpine fir series. This component represents 30 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest; Larry Laing, Helena National Forest

LTA57-M332D
LTA57-M331A

GLACIATED MOUNTAIN SLOPES: GNEISSES AND SCHISTS

Location: This LTA is located mostly in the Beartooth Mountains of southwest Montana. A very small acreage occurs in the Bridger Range.

Acreage by Section

57-M332D	569
57-M331A	177,582

LTA Setting and General Characteristics

Differentiating Characteristics: This map unit occurs in a glaciated mountain landscape setting, which is typically composed of moraines. Parent materials are very bouldery glacial till underlain by gneiss and schist bedrock. In the Bridger Range this unit consists mostly of weakly metamorphosed granite.

Accessory Characteristics: The primary soils are deep, with very bouldery medium to moderately coarse textures. The vegetation is a mosaic of coniferous forest. Mean annual precipitation ranges from 55 to 114 cms. (22 to 50 inches). The elevation range is 1675 to 2743 meters (5500 to 9000 feet). The dominant slopes have gradients of 0 to 80 percent.

LTA Components: This landtype association consists of ground moraines in grassland, ground moraine in forest, and lateral moraines.

Ground moraines are formed in glacial till developed from gneiss and schist material. Slope gradients range from 5 to 20 percent. Forested soils on these landforms are shallow to deep, weakly developed, and very bouldery medium to moderately coarse textured. These soils are classified as Typic Cryumbrepts, Typic Cryochrepts, Typic Cryofluvents, and Lithic Cryorthents. The dominant potential natural vegetation is Douglas-fir, limber pine and subalpine fir. This component represents 70 percent of this unit.

Ground moraines in grassland are formed in glacial till developed from gneiss and schist with some probable addition of loess. Soils are Typic Cryoborolls, and Argic Cryoborolls. They are moderately coarse to medium textured, deep, and moderately fertile. The dominant potential natural vegetation is Idaho fescue and bluebunch wheatgrass. Rock outcrop makes up 5 percent of the unit. This component represents 15 percent of this unit.

Lateral moraines are formed in glacial till developed from gneiss and schist material. Slope gradients range from 50 to 80 percent. Soils on these landforms are shallow to deep, moderately developed, medium and moderately fine textured. These soils are classified as Typic Cryoborolls, Typic Cryochrepts, and Typic Cryoboralfs. Rock outcrop occurs on about 10 percent of this landscape component. The dominant potential natural vegetation is Douglas-fir and subalpine fir. This component represents 15 percent of this unit.

Compiled by: John R. Lane, Custer National Forest and Henry Shovic, Gallatin National Forest

LTA60-M332D

MOUNTAIN SLOPES AND RIDGES: METASEDIMENTARY (BELT)

Location: This LTA is located in the Big Belt and Elkhorn Mountains and the Nevada-Alice Range within the Missouri River Basin.

Acreage by Section

60-M332D	310,782

LTA Settings and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountainous landscape setting, which is typically composed of mountain ridges, mountain slopes, structural benches and rolling uplands. Parent materials are residuum and colluvium underlain by argillite, siltite and quartzite with sandstone, shale and andesitic dikes and sills in places. Belt rocks within this section tend to be weakly metamorphosed and relatively thin bedded. They are often shale-like in appearance.

Accessory Characteristics: The primary soils are shallow, moderately deep and deep and are medium textured. The vegetation is a mosaic of coniferous forest, shrublands and mountain grasslands. Mean annual precipitation ranges from 25 to 75 centimeters (10 to 30 inches). The elevation range of this LTA is 1068 to 2288 meters (3500 to 7500 feet). The dominant slopes have gradients of 10 to 60 percent. This LTA is highly to slightly dissected (widely to closely spaced drainages) by streams within the rolling upland, structural bench and mountain slope components of this LTA. The rolling uplands and structural benches tend to be moderately incised whereas the mountain slopes are deeply incised by streams. The dominant stream pattern is dendritic. The mountain ridge component of this LTA is undissected.

LTA Components: This landtype association consists of mountain slopes, mountain ridges, structural benches, and rolling uplands.

Mountain slopes are formed in colluvium and residuum mostly derived from argillite and siltite with sandstones, shales, and andesitic dikes and sills in places. Slope gradients range from 25 to 60 percent. Soils on these landforms are mostly deep and very deep. They tend to have moderate subsoil clay accumulation, particularly on the moderate slopes. The weakly metamorphosed zone within this section tends to have soils dominated by gravelly and channery rock fragments. They typically have gravelly, very gravelly, extremely gravelly, channery, very channery or extremely channery silt loam, loam or sandy loam surface textures in forested areas. Cobbles or flaggy material sometimes dominate in the more metamorphosedand thickly bedded Belts in parts of subsection M332Di. They are shallow and moderately deep, have modest development (dark surface layers and moderate clay subsoil accumulation where the soils are deeper), and have loam surfaces on grassland and shrubland potential sites. Subsurface textures (in both forested and non-forested settings) include mostly very to extremely gravelly and channery loams, clay loams and sandy loams. Some cobbly or flaggy material is associated with the more thickly bedded Belt rocks near the Continental Divide in subsection M332Di. Forested soils on moderate slopes are typically classified as Typic and Mollic Cryoboralfs. The steeper slopes are often more weakly developed Typic and Lithic Ustochrepts and Typic Cryochrepts. Lithic and Argic Cryoborolls and Typic Haploborolls are associated with grassland/shrubland potential sites. Rock outcrop occurs on about 5 percent of this landscape component. The dominant potential natural vegetation is

subalpine fir and Douglas-fir series. Grassland/shrubland series include Idaho fescue, big sagebrush, and rough fescue. This component represents 60 percent of this LTA.

Mountain ridges are formed in residuum mostly derived from argillite and siltite with sandstone and shales in places. Thin volcanic ash influenced loess deposits affect the surface soils at higher elevations. Slope gradients range from 10 to 40 percent. Grassland or shrubland soils on these landforms are shallow and moderately deep, are moderately developed (thick dark surface layers and subsoil clay accumulation where soils are deeper), and have loam or channery loam surface textures. Forested soils are moderately deep and deep, are weakly or moderately developed and have loam, channery loam, channery silt loam. Subsurface textures for both forested and non-forested potential sites include very channery and extremely channery loams. Very cobbly and extremely cobbly loams and (in association with quartzite bedrock) extremely cobbly sandy loam can occur in some areas within the more metamorphosed Belts in subsection M332Di. These soils are classified as Lithic and Argic Cryoborolls, Mollic Cryoboralfs and Typic Cryochrepts. Rock outcrop occurs on about 5 percent of this landscape component. The dominant potential natural vegetation is rough fescue, Idaho fescue, big sagebrush, limber pine, Douglas-fir and subalpine fir series. This component represents 30 percent of this LTA.

Structural benches are formed in colluvium and residuum derived from argillite and siltite with sandstone and shale in places. Slope gradients range from 10 to 30 percent with inclusions of short 40 to 60 percent slopes near some drainages. Soils on these landforms are shallow and moderately deep and weakly developed at lower elevations. They are deep or very deep and better developed at higher elevations. Surface textures are mostly very gravelly or channery loam or extremely gravelly loam. Subsurface layers can have very to extremely gravelly or channery loam textures. Some very or extremely cobbly loams or clay loams can occur, particularly in the more metamorphosed zones in subsection M332Di. These soils are classified as Lithic and Typic Ustochrepts at lower elevations and Typic Cryoboralfs and Typic Cryochrepts at higher elevations. Rock outcrop occurs on about 5 percent of this landform. The dominant potential natural vegetation includes Idaho fescue and bluebunch wheatgrass series. Forested habitat types at low elevations include Douglas-fir and ponderosa pine in some drainages and on some north aspects. Subalpine fir and Douglas-fir series dominate at higher elevations. Tufted hairgrass series occurs in depressions at higher elevations. This component represents 8 percent of this LTA.

Rolling uplands are formed in residuum and colluvium derived from argillite and siltite with sandstone, shale and basalt in places. Slope gradients range from 10 to 25 percent. Soils on these landforms are shallow and moderately developed (dark surface layers). They have silt loam and sandy clay loam surface textures. Subsurface layers tend to be very stony sandy clay loam. These soils are classified as Lithic Argiborolls . Rock outcrop occurs on about 5 percent of this landscape component. The dominant potential natural vegetation is Idaho fescue and bluebunch wheatgrass series. This inclusion represents 2 percent of this LTA.

Compiled by: Larry Laing, Helena National Forest

LTA61-M332D
LTA61-M332E

MOUNTAIN SLOPES AND RIDGES: HIGHLY WEATHERED GRANITICS

Location: This LTA is located in the Boulder, Elkhorn and Highland Mountains on the Beaverhead-Deerlodge National Forest and the Helena National Forest in southwest Montana. It occurs in the upper Jefferson River, Prickly Pear Creek, 10 Mile Creek and Clark Fork River Basins.

Acreage by Subsection

61-M332D	251,536
61-M332E	308,903

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountain landscape setting, which is typically composed of stream dissected mountain slopes, rolling uplands and alluvial flats. Parent materials are residuum underlain by weathered granitic bedrock.

Accessory Characteristics: The primary soils are shallow to deep with gravelly sandy and loamy textures. The vegetation is a mosaic of shrublands and grasslands and coniferous forest. Small areas of aspen are common. Mean annual precipitation ranges from 30 to 76 centimeters (12 to 30 inches). The elevation range of this LTA is 1373 to 2591 meters (4500 to 8500 feet). The dominant slopes have gradients of 10 to 50 percent. This LTA is moderately or highly dissected by streams, with the dominant stream pattern being dendritic. Wetlands are a major component in this LTA on the Deerlodge National Forest.

LTA Components: This landtype association consists of stream dissected mountain slopes, rolling uplands, and alluvial flats.

Stream dissected mountain slopes are formed in weathered granitic bedrock. Slope gradients range from 10 to 50 percent. Soils on these landforms are shallow and moderately deep, weakly and moderately developed, with gravelly sandy and loamy textures. These soils are classified as Typic and Lithic Cryoborolls, Cryochrepts, Cryoboralfs, and Cryorthents. Rock outcrop occurs on about 20 percent of this landscape component. The dominant potential natural vegetation is sagebrush, Idaho fescue, Douglas-fir and subalpine fir series. This component represents 55 percent of this LTA.

Rolling uplands are formed in moderately and weakly weathered granitics granite-diorites and diorites. Slope gradients range from 10 to 40 percent. Soils on these landforms are moderately deep and deep, are weakly and moderately developed, and have sandy loam, gravelly sandy loam and loamy sand surface soils. The subsurface layers are gravelly sandy loams, gravelly loamy sands and loamy sands in the less developed soils and gravelly sandy clay loams and sandy clay loams where subsoil clay accumulation occurs. Ustochrepts, Eutroboralfs and Haploborolls prevail at the lower elevations. Typic and Lithic Cryoboralfs and Cryoborolls dominate at the mid to high elevations. Rock outcrop occurs on about 5 percent of this landscape component. Boulders are scattered on the surface on parts of the unit. The dominant potential natural vegetation is Douglas-fir series. The grassland/shrublands are dominated by mountain big sagebrush and roughfescue series. Spruce dominates the wet forest inclusions. This component represents 35 percent of this LTA.

Alluvial flats are formed in weathered granitic bedrock. Slope gradients range from 0 to 15 percent. Soils on these landforms are deep, weakly developed, with gravelly loamy textures. These soils are classified as Oxyaquic and Typic Cryochrepts and Cryoborolls. Rock outcrop does not occur on this landscape component. The dominant potential natural vegetation is willow, sedge, spruce, and subalpine fir series. This component represents 10 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest; Larry Laing, Helena National Forest

LTA62-M332D
LTA62-M332E

MOUNTAIN SLOPES AND RIDGES: WEAKLY WEATHERED GRANITICS

Location: This LTA is located in the Ten Mile Creek basin, the Elkhorn Mountains, the Big Belt Mountains, and the Continental Divide Uplands.

Acreage by Section

62-M332D	88,948
62-M332E	949

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs in a mountainous landscape setting, which is typically composed of mountain slopes and ridges. Parent materials are residuum and colluvium underlain by granite, granitic diorite and diorite.

Accessory Characteristics: The primary soils have medium or moderately coarse textured surfaces and moderately coarse and coarse textured subsurface layers. The vegetation is a mosaic of coniferous forest and forested scree. Mean annual precipitation ranges from 50 to 75 centimeters (20 to 30 inches). The elevation range of this LTA is 1554 to 2438 meters (5100 to 8000 feet). The dominant slopes have gradients of 10 to 60 percent. This LTA is primarily undissected.

LTA Components: This landtype association consists of mountain slopes and ridges.

Mountain slopes and ridges are formed in weakly weathered granites, granite-diorites, and diorites. Higher elevations can have volcanic ash influenced surface soil. Slope gradients range from 10 to 60 percent. Soils on these landforms are extremely variable in terms of depth to bedrock, display little to no soil development and have cobbly loam, extremely cobbly sandy loam and extremely bouldery sand surface soils. Subsurface soils vary also and include extremely cobbly sandy loam, very cobbly sandy loam and extremely bouldery sand textures. These soils are mostly classified as Typic Cryochrepts and Typic Cryorthents. Boulders are scattered about the surface in portions of the unit. Rock outcrop and scree occurs on about 45 percent of this landscape component. The dominant potential natural vegetation is subalpine fir-whitebark pine series at the higher elevations with subalpine fir and Douglas-fir series on the lower slopes. This component represents 100 percent of this LTA.

Compiled by: Larry Laing, Helena National Forest

LTA63-M332D

MOUNTAIN SLOPES AND RIDGES:
SCHISTS, GNEISSES AND ASSOCIATED METAMORPHICS

Location: This LTA occurs mainly in the Little Belt, Crazy and Castle mountains. This unit includes high elevation ridges within the Big Belts Mountains.

Acreage by Section

63-M332D	149,345

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs on ridges and steep valley sideslopes. Parent materials are gneiss, sandstone, shale and granite.

Accessory Characteristics: The primary soils are moderately deep skeletal loams and sandy loams. The vegetation is mostly grassland with some forested areas. Mountain ridgetop alpine meadows dominate in the Big Belt Mountains. Mean annual precipitation ranges from 50 to 100 centimeters (20 to 40 inches). The elevation range of this LTA is 1524 to 2134 meters (5000 to 7000 feet) on the Lewis and Clark National Forest and 2440 to 2898 meters (8000 to 9500 feet) on the Helena National Forest. The dominant slopes have gradients of 25 to 60 percent. This LTA is moderately dissected by streams, with the dominant stream pattern being dendritic. Mountain ridges are often undissected.

LTA Components: This landtype association consists of steep valley sideslopes, and ridges and lower valley slopes.

The steep valley sideslopes are formed in sandstone, basalt, and gneiss. Slope gradients range from 25 to 60 percent. Soils on these landforms are moderately deep, weakly developed, extremely cobbly sandy-loams. These soils are classified as Typic Cryoboralfs and Typic Cryochrepts. Mollisolls are scattered throughout the Little Belts and Highwood Mountains. The dominant potential natural vegetation is a mosaic of subalpine fir and rough fescue. This component represents 35 percent of this LTA.

The ridges and lower valley slopes are formed in sandstone and shale. Slope gradients are 10 to 40 percent. Soils on these landforms are deep to moderately deep and moderately well developed. They have loam surfaces and clay loam or clay subsoils These soils are classified as Boralfic Cryoborolls and Aquic Cryoboralfs. Typic Cryumbrepts dominate in the Big Belts Mountains. They are mostly moderately deep with sandy loam surfaces and very gravelly sandy loam subsurface layers. The dominant potential natural vegetation is rough fescue and subalpine fir series on the Lewis and Clark National Forest and Idaho fescue series in the Big Belt Mountains. This component represents 50 percent of this LTA. Small wetlands occur within this unit.

Compiled by: Richard Saunders, Lewis and Clark National Forest
Revised by Larry Laing, Helena/Lewis and Clark National Forests.

LTA64-M332Db
LTA64-331D

MOUNTAIN SLOPES AND RIDGES: VOLCANICS

Location: This LTA is located mostly in the Highwood and Castle mountain ranges in central Montana in the Missouri River Basin. Smaller amounts occur in the Little Belt, Snowy and Judith Mountains subsection.

Acreage by Subsection

64-M332Db	3,240
64-331D	26,813

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs in a mountain slope landscape setting, which is typically composed of moderately steep to steep mountain slopes and valley sideslopes. Parent materials are latite, rhyolites, and shonkinites.

Accessory Characteristics: The primary soils are well drained, 20 to 60 inches in depth, slightly acidic to neutral and loamy skeletal. Vegetation is a complex of grassland and lodgepole pine forest. Mean annual precipitation ranges from 51 to 76 centimeters (20 to 30 inches). The elevation range of this LTA is 1371 to 1982 meters (4500 to 6500 feet). The dominant slopes have gradients of 25 to 60 percent. This LTA is well dissected by streams, with the dominant stream pattern being subparallel. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of stream dissected mountain slopes.

Stream dissected mountain slopes are formed in colluvium derived from rhyolite, latite, and shonkinite parent materials. Slope gradients range from 25 to 60 percent. Soils on these landforms are weakly developed, 20 to 60 inches in depth; loam topsoils are 4 to 10 inches thick, subsoils are brown loam with 10 to 75 percent cobble. These soils are classified as Typic Cryochrepts. Rock outcrop occurs on about 10 percent of this landscape component. The dominant potential natural vegetation is Douglas-fir at lower elevations, and subalpine fir at higher elevations.

Compiled by: Robin Strathy, Lewis and Clark National Forest

LTA64-M332De
LTA64-M332Be
LTA64-M332Bk

MOUNTAIN SLOPES AND RIDGES: VOLCANICS

Location: This LTA is located in the Sapphire and Boulder Mountains on the Beaverhead-Deerlodge and Helena National Forests in the upper Clark Fork River Basin in southwest Montana. It also occurs along the Continental Divide in the Alice-Nevada Mountains.

Acreage by Subsection

64-M332De	6,116
64-M332Be	12,963
64-M332Bk	7,098

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountainous landscape setting, which is typically composed of mountain slopes and ridges. Parent materials are residuum and colluvium underlain by rhyolite and tuff. Ridges often have ash influenced soil surfaces.

Accessory Characteristics: The primary soils have medium textured to moderately coarse textured surfaces and moderately coarse to coarse textured subsurface layers. The vegetation is coniferous forest. Mean annual precipitation ranges from 50 to 75 centimeters (20 to 30 inches). The elevation range of this LTA is 1676 to 2195 centimeters (5500 to 7200 feet). The dominant slopes have gradients of 10 to 60 percent. The mountain slopes within this LTA are poorly dissected by weakly incised streams. Ridges are mostly undissected.

LTA Components: This landtype association consists of mountain slopes and ridges.

Mountain slopes and ridges are formed in rhyolites and tuffs. Slope gradients range from 10 to 60 percent. Soils on these landforms are moderately deep and weakly developed. Surface textures range from very gravelly sandy loam on steeper slopes to loams on volcanic ash influenced ridges. Subsurface textures are often very cobbly coarse sandy loam or extremely cobbly loamy sand. These soils are classified as Dystric Cryochrepts and Andic Cryochrepts. Rock outcrop occurs on about 5 percent of this landscape component. The dominant potential natural vegetation is subalpine fir. Small areas of subalpine fir-whitebark pine series occur at high elevations. This component represents 100 percent of this LTA.

Compiled by: Larry Laing, Helena National Forest

LTA64-M332D
LTA64-M332E
LTA64-M331A

MOUNTAIN SLOPES AND RIDGES: VOLCANICS

Location: This LTA is located in the Boulder, Elkhorn, Fleecer, Anaconda, Pintlar, Beaverhead, Madison, Pioneer, Lima Peaks, Gravelly, Tendoy, and Gallatin Mountains on the Beaverhead-Deerlodge, Helena, and Gallatin National Forests. It occurs in the upper Missouri River Basin and the upper Little Blackfoot drainage in southwest Montana.

Acreage by Section

M332D	190,576	(Section except for M332Db and M332De)
M332E	216,157	
M331A	21,407	

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountain landscape setting, which is typically composed of stream dissected mountain slopes and mountain ridges. Parent materials are residuum underlain by Tertiary and Cretaceous volcanic bedrock, including andesite, dacite, rhyolite, welded and non-welded rhyolite and felsic tuffs, and locally basalt and minor metagrabbro dikes.

Accessory Characteristics: The primary soils are shallow, moderately deep and deep loamy soils often with high cobble contents. The vegetation is a mosaic of coniferous forest and shrubland/grassland, coniferous forest or shrubland /grassland. Mean annual precipitation ranges from 38 to 75 centimeters (15 to 30 inches). The elevation range of this LTA is 1525 to 2378 meters (5000 to 7800 feet). The dominant slopes have gradients of 5 to 60 percent. The mountain slopes component of this LTA are moderately dissected by streams with the dominant stream patterns being parallel or dendritic. The mountain ridges are generally undissected. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of stream dissected mountain slopes, and mountain ridges.

Stream dissected mountain slopes are formed in colluvium and residuum over a variety of volcanic bedrock. Some high elevation areas are influenced by volcanic ash loess deposits. Slope gradients range from 25 to 60 percent. Soils on these landforms are shallow, moderately deep and deep to bedrock. They are moderately and weakly developed with cobbly and very cobbly loam surface textures. The subsurface layers are very cobbly and extremely cobbly loams. These soils are classified as Typic and Lithic Cryochrepts and Cryoborolls, and Typic and Mollic Cryoboralfs. Rock outcrop occurs on about 10 percent of this landscape component. The dominant potential natural vegetation is Douglas-fir and subalpine fir series. This component represents 50 percent of this LTA.

Mountain ridges are formed in residuum and colluvium over a variety of volcanic bedrock. Some high elevation areas are influenced by volcanic ash loess deposits. Included in this component is rolling uplands found in the eastern portion of the Elkhorns. Slope gradients range from 10 to 40 percent. Soils on these landforms are mostly moderately deep and shallow to bedrock. They are moderately and weakly developed with cobbly, stony and very cobbly loam or loam surface textures. The subsurface layers are very cobbly, very stony, extremely cobbly and extremely stony loams and clay loams. These soils

are mostly classified as Typic and Lithic Cryochrepts on forested sites and Argic and Lithic Cryoborolls on grassland/shrublands. Rock outcrop occurs on about 10 percent of this landscape component. The dominant potential natural vegetation is rough fescue, big sagebrush, Douglas-fir, and subalpine fir series. This component represents 50 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest; Larry Laing, Helena National Forest

LTA65-M332D
LTA65-M332E

MOUNTAIN SLOPES AND RIDGES: SOFT SEDIMENTARY ROCKS

Location: This LTA is located in nearly all the mountain ranges on the Lewis and Clark (Rocky Mountain Front, Big & Little Snowies, Crazies, Castles, and Little Belt mountains). It also occurs in the Fleecer and Bull Mountains in southwest Montana on the Beaverhead-Deerlodge Forest.

Acreage by Section

65-M332D	42,266
65-M332E	17,413

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs on benches, basins, ridges, and valley sideslopes. Parent materials are soft sandstones and shales.

Accessory Characteristics: The primary soils are shallow, moderately deep and deep, skeletal, loams and sandy loams. The vegetation is coniferous forest and fescue grassland. Mean annual precipitation ranges from 41 to 76 centimeters (16 to 30 inches). The elevation range of this LTA is 1500 to 2439 meters (5000 to 8000 feet). The dominant slopes have gradients of 10 to 60 percent. This LTA is moderately dissected with the dominant stream pattern being dendritic. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of benches and lower valley slopes, steep valley sideslopes, and ridges and upland flats and basins.

Benches and lower valley slopes are formed in shale, sandstone, and alluvium. These landforms have slope gradients that range from 0 to 25 percent. Soils on these landforms are moderately deep and deep, well developed, and consist mainly of clay loam and clay. The major soils are classified as Typic and Vertic Cryoborolls. Rock outcrop occurs on 5 percent of this landscape component. The dominant potential natural vegetation is rough fescue and Douglas-fir. This component represents 30 percent of this LTA.

Steep valley sideslopes are formed in shale and sandstone. These landforms have slope gradients that range from 25 to 60 percent. Soils on these landforms are moderately deep, weakly developed, and consist mainly of very gravelly and cobbly loams and sandy loams. The major soils are classified as Typic Cryoborolls and Cryoboralfs. Rock outcrop makes up less than 15 percent of this component. The dominant potential natural vegetation is rough fescue subalpine fir, Douglas-fir, and limber pine. This component represents 35 percent of this LTA.

Ridges and upper slopes and basins are formed in sandstone and shale. These landforms have slope gradients that range from 10 to 40 percent. Soils on these landforms are extremely cobbly loams and sandy loams. The major soils are classified as Typic and Andic Cryoborolls and Cryochrepts. Rock outcrop makes up less than 15 percent of this LTA. The dominant potential natural vegetation is Douglas-fir and rough fescue. This component represents 20 percent of this LTA.

Compiled by: Richard Saunders, Lewis and Clark National Forest

LTA66-M332Dm
LTA66-M332Ea

MOUNTAIN SLOPES AND RIDGES: CARBONATES

Location: This LTA is located in the Elkhorn and Highland Mountains on the Beaverhead-Deerlodge National Forest in southwest Montana in the Jefferson River Basin.

Acreage by Subsection

66-M332Dm	19,493
66-M332Ea	4,501

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountain landscape setting, which is typically composed of stream dissected mountain slopes. Parent materials are residuum underlain by limestone bedrock.

Accessory Characteristics: The primary soils are shallow and moderately deep with cobbly loamy textures. The vegetation is a mosaic of coniferous forest and shrublands and grasslands. Mean annual precipitation ranges from 36 to 51 centimeters (14 to 20 inches). The elevation range of this LTA is 1677 to 2287 meters (5500 to 7500 feet). The dominant slopes have gradients of 10 to 50 percent. This LTA is moderately dissected by streams, with the dominant stream pattern being parallel. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of stream dissected mountain slopes.

Stream dissected mountain slopes are formed in limestone bedrock. Slope gradients range from 10 to 50 percent. Soils on these landforms are shallow and moderately deep, moderately developed, and have cobbly loamy textures. These soils are classified as Typic and Lithic Cryochrepts and Cryoboralfs; and Argic and Lithic Cryoborolls. Rock outcrop occurs on about 15 percent of this landscape component. The dominant potential natural vegetation is Idaho fescue, sagebrush, Douglas-fir and subalpine fir series. This component represents 100 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest

LTA66-M332D

MOUNTAIN SLOPES AND RIDGES: CARBONATES

Location: This LTA is located primarily in the Little Belt, Big Belt and Elkhorn Mountain Ranges.

Acreage by Section

66-M332D	360,264	(Section except M332Dm)

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs on ridgetops, plateaus or dip slopes, steep valley slopes, and benchy lower valley slopes. Parent materials are Paleozoic limestones.

Accessory Characteristics: The primary soils are moderately deep, loamy-skeletal soils with loamy textures. The local vegetation can be dominantly forest, a mosaic of grassland/shrubland and forest, or grassland /shrubland. Mean annual precipitation ranges from 50 to 127 centimeters (15 to 50 inches). The elevation range of this LTA ranges from 1068 to 2878 meters (3500 to 9500 feet). The dominant slopes have gradients of 10 to greater than 60 percent.

LTA Components: This landtype association consists of ridge tops, plateaus and dip slopes, steep valley sideslopes, and benchy lower sideslopes. All of these are typically formed in limestone.

Ridgetops typically have slopes of 10 to 25 percent. Soils on these landforms are moderately deep and weakly to moderately developed. Surface textures are silt loams or gravelly to very gravelly silt loams or silty clay loams. Subsurface textures are generally very or extremely gravelly silt loams, clay loams or silty clay loams. The major soils are classified as Typic Cryochrepts in the Little Belt Mountains. Calcic Cryoborolls, Mollic Cryoboralfs and Lithic Cryochrepts dominate in the other subsections. The major potential natural vegetation is rough fescue, big sagebrush, Douglas-fir, whitebark pine-subalpine fir and spruce series. Rock outcrop occurs on less than 15 percent of this LTA. This component represents 30 percent of this LTA. Plateaus or dip slopes are typically on slopes of 10 to 25 percent. Soils on these landforms are mostly moderately deep or shallow and weakly to moderately developed. Surface textures are gravelly or very gravelly loams, silty clay loams or silt loams. The subsurface layers are very or extremely gravelly loams and silt loams. The major soils are classified as Typic Ustochrepts in the Little Belts. Lithic Ustochrepts, Calcic Cryoborolls and Mollic Cryoboralfs dominate in the other subsections. The major potential natural vegetation is Douglas-fir, ponderosa pine, rough fescue, and big sagebrush series. Rock outcrop occurs on less than 15 percent of this LTA. This component represents 20 percent of this LTA.

Steep valley sideslopes are on slopes of 25 to 60 percent. Soils on these landforms are moderately deep, moderately well developed, Typic Cryochrepts. The major potential natural vegetation is Douglas-fir and subalpine fir. Rock-outcrop occurs on less than 15 percent of this LTA. This component represents 40 percent of this LTA.

Benchy lower sideslopes are on slopes of 10 to 25 percent. Soils on these landforms are moderately deep and deep, weakly and moderately well developed. They are mainly Typic Cryoboralfs and Cryoborolls, with considerable acreage of Vertic Cryoborolls. The major potential natural vegetation is Douglas-fir. Rock outcrop occurs on less than 15 percent of this LTA. This component represents 10 percent of this LTA.

Compiled by: Richard Saunders, Lewis and Clark National Forest, and Larry Laing Helena and Lewis and Clark National Forests.

LTA67-M332D

MOUNTAIN SLOPES AND RIDGES: QUARTZITES

Location: This LTA is located primarily in the Little Belt Mountain Range.

Acreage by Section

67-M332D	41,037

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs on ridgetops and hilly valley floors. Parent material is dominantly quartzite from Cambrian and Precambrian formations.

Accessory Characteristics: The primary soils are deep, loamy-skeletal, stony sandy-loams. The vegetation is coniferous forest. Mean annual precipitation is 64 to 76 centimeters (25 to 30 inches). The elevation range is 1981 to 2286 meters (6500 to 7500 feet). The dominant slopes have gradients of 0 to 10 percent.

LTA Components: This landtype association consists of ridge tops and hilly valley floors.

These ridge tops and hilly valley floors have slopes of 0 to 10 percent. Soils on these landforms are deep, weakly developed, Typic Cryochrepts. The major potential natural vegetation series is Douglas-fir. Rock outcrop occurs on less than 15 percent of this LTA. This component represents the entirety of this LTA.

Compiled by: Richard Saunders, Lewis and Clark National Forest

LTA68-M332Dm

MOUNTAIN SLOPES AND RIDGES: SANDSTONES AND SHALES

Location: This LTA is located in the Elkhorn Mountains, Beaverhead-Deerlodge and Helena National Forests in the Jefferson River Basin in southwest Montana.

Acreage by Subsection

68-M332Dm	14,194

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountain landscape setting, which is typically composed of stream dissected mountain slopes. Parent materials are residuum and colluvium underlain by sandstone and shale bedrock.

Accessory Characteristics: The primary soils are shallow and moderately deep with gravelly, channery and cobbly loamy textures. The vegetation is a mosaic of coniferous forest, shrublands, and grasslands. Mean annual precipitation ranges from 25 to 76 centimeters (10 to 30 inches). The elevation range of this LTA is 1464 to 2439 meters(4800 to 8000 feet). The dominant slopes have gradients of 10 to 50 percent. This LTA is moderately dissected by streams with the dominant stream patterns being parallel and dendritic. Mountain ridges tend to be undissected. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of stream dissected mountain slopes.

Stream dissected mountain slopes are formed in sandstone and shale bedrock. Some areas of mountain ridges and structural benches are included in this component. Slope gradients range from 10 to 50 percent. Soils on these landforms are shallow and moderately deep, moderately developed, with gravelly, channery and cobbly loamy textures. These soils are classified as Typic and Lithic Cryochrepts, Mollic and Typic Cryoboralfs, Typic Eutroboralfs, Lithic and Typic Ustochrepts, and Lithic and Argic Cryoborolls. Rock outcrop occurs on about 10 percent of this landscape component. The dominant potential natural vegetation is Douglas-fir and subalpine fir series. Grassland/shrubland series include Idaho fescue, rough fescue, and big sagebrush. This component represents 100 percent of this LTA.

Compiled by: Dave Ruppert, Deerlodge National Forest; Larry Laing, Helena National Forest

LTA68-M332Dp
LTA68-M331Aa
LTA68-M331Ap

MOUNTAIN SLOPES AND RIDGES: SANDSTONES AND SHALES

Location: This unit is located in the Bridger, Gallatin, and Madison Mountain Ranges in southwestern Montana.

Acreage by Section:

68-M332Dp	81,951
68-M331Aa	20,334
68-M331Ap	79,259

LTA Setting and General Characteristics

Differentiating Characteristics: This map unit consists of a complex of mountain slopes and ridges, with overall shapes controlled by underlying bedrock structure. Soil parent material is colluvium and residuum derived from thinly to thickly interbedded sandstone and shale with some limestone.

Accessory Characteristics: Vegetation is dense lower subalpine forest or mountain grassland. Elevation ranges from 1981 to 2377 meters (6500 to 7800 feet). Mean annual precipitation is 75 to 100 centimeters (30 to 40 inches). Slope ranges from 0 to 40 percent.

LTA Components: This landtype association has four components:

Soils in mountain grasslands are Typic Cryoborolls and Argic Cryoborolls. They are deep, medium to moderately fine textured, rocky in some areas, and have moderate to high fertility and water holding capacity. Rock outcrop makes up 5 percent of this component. Common potential vegetation includes Idaho fescue and big sagebrush series. This component makes up 20 percent of this LTA.

Where rock types are thinly inter-bedded sandstone and shale and vegetation is densely or sparsely forested, soils are Typic and Mollic Cryoboralfs and Argic Cryoborolls. They are deep, medium textured, rocky, and have moderate fertility and water holding capacity. Rock outcrop makes of 5 to 20 percent of this component. Common potential vegetation includes Douglas-fir, subalpine fir, Idaho fescue and big sagebrush series. This component makes up 40 percent of this LTA.

Where rock types are thickly inter-bedded sandstone and shale, and vegetation is densely or sparsely forested, soils are Typic and Mollic Cryoboralfs, Argic Cryoborolls, and Typic Argiborolls. They are deep, medium to moderately fine textured, non-rocky, and have high fertility and water holding capacity. Rock outcrop makes of 5 to 20 percent of this component. Common potential vegetation includes subalpine fir, subalpine fir-whitebark pine, Douglas-fir, Idaho fescue and big sagebrush series. This component makes up 20 percent of this LTA.

Where rock types are limestone, sandstone, and shale, soils are Typic Ustochrepts, Typic Calciborolls, Cryoboralfs and Cryochrepts. These soils are deep to moderately shallow, moderately coarse to moderately fine textured, rocky, and have low to moderate fertility and water holding capacity. Rock outcrop makes up 15 to 25 percent of this component. Common potential vegetation includes subalpine fir and Douglas-fir series. This component makes up 20 percent of this LTA.

Compiled by: Henry Shovic, Gallatin National Forest

LTA68-M332D
LTA68-M332C
LTA68-331D

MOUNTAIN SLOPES AND RIDGES: SANDSTONES AND SHALES

Location: This LTA is located in the Little Belt Mountains and along the Rocky Mountain Front on the Lewis and Clark National Forest, and in the Elkhorn Mountains on the Beaverhead-Deerlodge Forest.

Acreage by Section

68-M332D	240,099	(Section except for M332Dm and M332Dp)
68-M332C	80,557	
68-331D	8,549	

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountain slope or ridge setting which is typically composed of stream-dissected mountain slopes and ridges. Parent materials are sandstone and shale.

Accessory Characteristics: The primary soils are moderately deep, loamy-skeletal loamy-sands and loams. The vegetation is a mosaic of subalpine fir and rough fescue series. Mean annual precipitation ranges from 36 to 89 centimeters (14 to 35 inches). The elevation range of this LTA is 1524 to 2438 meters (5000 to 8000 feet). This LTA is moderately dissected by streams with the dominant pattern being parallel. Wetlands are a minor component.

LTA Components: This landtype association consists of low relief ridges and slopes, and steep valley sideslopes.

The low relief ridges and slopes are formed in sandstone and shale. Slope gradients are from 10 to 40 percent. Soils on these landforms are moderately deep to deep, moderately well developed, extremely gravelly loams. These soils are classified as Typic and Argic Cryoborolls. Rock outcrop occurs on about 5 percent of this landscape component. The dominant potential natural vegetation is rough fescue and subalpine fir. This component represents 55 percent of this LTA.

The steep valley sideslopes are formed in sandstone and shale. Slope gradients are from 40 to 60 percent. The soils are classified as Typic and Andic Cryochrepts in Subsections M332Cb, M332Cd, M332Dc, and M332Dd; soils in subsection M332Dm are Cryoboralfs. Rock outcrop occurs on about 10 percent of this landscape component. The dominant potential natural vegetation is subalpine fir. This component represents 30 percent of this LTA.

Compiled by: Richard Saunders and Robin Strathy, Lewis and Clark National Forest

LTA69-M332D

PEDIMENTS: GRAVEL MANTLED VOLCANICS AND TERTIARY SEDIMENTS

Location: This LTA is located in the foothills near the Bull Mountains and Elkhorn Mountains in the vicinity of the Beaverhead-Deerlodge National Forest in southwest Montana. It also occurs in the Boulder River basin in Subsection M332Dk.

Acreage by Section

69-M332D 27,695

LTA Setting and General Characteristics

Differentiating characteristics: This LTA occurs in a valley landscape setting which is typically composed of pediments and alluvial fans. Parent materials are coarse mantle deposits from a variety of sources, deposited over volcanic and Tertiary sedimentary bedrock.

Accessory Characteristics: The primary soils are shallow and moderately deep, cobbly and gravelly sandy loams and loams. The vegetation is a mosaic of grasland and shrubland. Mean annual precipitation ranges from 25 to 36 centimeters (10 to 14 inches). The elevation range of this LTA is from 1372 to 1524 meters (4500 to 5000 feet). The dominant slopes have gradients of 5 to 10 percent. This LTA is moderately dissected by intermittent streams with the dominant stream patterns being parallel. Wetlands are a minor component of this unit.

LTA Components: This landtype association consists of two landform components: pediments and alluvial fans.

Pediments are formed on volcanic and Tertiary sedimentary rocks with a mantle of coarse debris from the adjoining uplands on the surface. Slope gradients range from 5 to 10 percent. Soils on these landforms are moderately deep to deep. They are moderately to weakly developed with cobbly and very cobbly sandy and loamy surface textures. The subsurface layers are cobbly and very cobbly loams and clay loams. These soils are classified as Ustochrepts, Argiborolls and Haploborolls. Rock outcrop occurs on about ten percent of this landscape component. The dominant potential natural vegetation is needle-and-thread grass/blue grama; bluebunch wheatgrass/blue grama, and sagebrush /bluebunch wheatgrass habitat types. This component represents 60 percent of this LTA.

Alluvial fans are formed in coarse alluvial and glaciofluvial deposits originating from a variety of bedrock types. Slope gradients range from 5 to 15 percent. Soils on these landforms are moderately deep to deep; are weakly to moderately developed, and have cobbly and gravelly sandy loam and loam surface soils. The subsurface layters are cobbly sandy loams and loams in the less developed soils and cobbly sandy clay loams and clay loams where subsoil clay accumulation occurs. These soils are classified as Ustochrepts, Argiborolls and Haploborolls. Rock outcrop occurs on less than 1 percent of this landscape component. The dominant potential natural vegetation is needle-and-thread/blue grama, bluebunch wheatgrass/blue grama, and sagebrush /bluebunch wheatgrass. This component represents 40 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest.

LTA70-M332D
LTA70-M332E

FROST SHATTERED MOUNTAIN RIDGE TOPS: METASEDIMENTARY (BELT)

Location: This LTA is located in the Fleecer, Highlands, Anaconda-Pintlar, Pioneer, Beaverhead, Tendoy, and Lima Peaks (Beaverhead Mountains) ranges of the Beaverhead/Deerlodge National Forest. It occurs in the Jefferson and Madison River Basins in southwest Montana.

Acreage by Section

70-M332D	419
70-M332E	132,440

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a relatively high elevation, gently to moderately sloping, mountain landscape setting, at or above the zone of moderate and strong frost shattering. The unit is typically composed of frost shattered ridges and slopes, ranging from patterned ground to soil heaving. Parent materials are colluvium and residuum from metamorphosed sediments of the Precambrian Belt Supergroup, undifferentiated, consisting of fine to coarse grained quartzite, siltite, argillite, carbonate, and sandstone.

Accessory Characteristics: The primary soils are very shallow to moderately deep, channery and flaggy sandy loams and loams. The vegetation is a mosaic of alpine turf, subalpine grasslands, subalpine forest, montane coniferous forest and mountain grassland. Mean annual precipitation ranges from 36 to 127 centimeters (14 to 50 inches). The elevation range of this LTA is 2134 to 3353 meters (7000 to 11000 feet). The dominant slopes have gradients of 25 to 50 percent. This LTA is slightly dissected by streams, with the dominant stream pattern being dendritic. Wetlands, lakes and ponds are a minor component of this unit. Some glaciated areas are included in this unit, but frost shattering has become a dominant landform process since glaciation.

LTA Components: This landtype association consists of frost shattered slopes and ridges.

Frost shattered slopes and ridges are formed in colluvium and residuum derived from metasediment rocks comprised mostly of quartzite, siltite, and argillite. Slope gradients range from 5 to 70 percent. Soils on these landforms are very shallow to moderately deep, weakly to moderately developed, stony loamy sands, sandy loams, and loams. These soils are classified as Typic and Alfic Cryorthents, and Alfic, Dystric, and Typic Cryochrepts. Rock outcrop occurs on about 15 percent of this landscape component. In the Highland Mountains, up to 50 percent of the unit is scree. The dominant potential natural vegetation is sedge, Idaho fescue, subalpine fir, whitebark pine-subalpine fir, and big sagebrush series. This component represents 98 percent of this LTA.

Compiled by: Dan Svoboda, Beaverhead-Deerlodge National Forest

LTA72-M332Db

FROST SHATTERED MOUNTAIN RIDGE TOPS: WEAKLY WEATHERED GRANITICS

Location: This unit is located in the Little Belt Mountains of west-central Montana.

Acreage by Section

72-M332Db	1,687

LTA Setting and General Characteristics

Differentiating characteristics: This map unit occurs in a high elevation mountain ridge landscape setting which is typically composed of frost shattered ridges and upper valley sideslopes. Parent materials are colluvium and residuum underlain by weakly weathered granitic rocks.

Accessory Characteristics: The primary subsoils are deep with clay loam textures and contain 35 to 50 percent rock fragments. The vegetation is coniferous forest. Mean annual precipitation ranges from 76 to 89 centimeters (30 to 35 inches). The elevation range is 2286 to 2590 meters (7500 to 8500 feet). The dominant slopes have gradients of 0 to 40 percent. This unit is slightly dissected by streams, with the dominant stream pattern being dendritic. Wetlands are a minor component of this unit. Small areas of glaciation are included in this map unit.

LTA Components: This landtype association consists of ridge tops and upper valley sideslopes.

Upper valley sideslopes are formed in a thin layer of wind-deposited silt that underlain by weakly weathered granitic rocks. Slope gradients range from 20 to 40 percent. Soils on this landform are deep and well drained. These soils are weakly developed and consist of silt loam surface layers and clay loam substrata. The dominant soils are classified as Typic Cryochrepts. Rock outcrop occurs on less than 5 percent of this landscape component. The dominant potential natural vegetation is subalpine fir, and whitebark pine-subalpine fir series. This component represents 70 percent of this unit.

Frost shattered ridge tops are formed in residuum and colluvium derived from weakly weathered granitic rocks. Slope gradients range from 0 to 20 percent. Soils on this landform are deep and well drained, and are simlar to those described above. Rock outcrop occurs on less than 5 percent of this landscape component. The dominant potential natural vegetation is subalpine fir, and whitebark pine-subalpine fir plant associations. This component represents 30 percent of this unit.

Compiled by: Robin Strathy, Lewis and Clark National Forest

LTA72-M332Dc
LTA72-M332Dp
LTA72-M332E
LTA72-M331A

FROST SHATTERED MOUNTAIN RIDGE TOPS: WEAKLY WEATHERED GRANITICS

Location: This unit is located in the Gallatin, Madison, Absaroka-Beartooth Mountain Ranges in southwestern Montana. Included are the Crazy Mountains, Bridger Mountains, Anaconda Mountains and Continental Divide Uplands.

Acreage by Section:

72-M332Dc	1,571
72-M332Dp	106
72-M332E	838
72-M331A	25,079

LTA Setting and General Characteristics

Differentiating Characteristics: This map unit consists of rounded ridgetops with weak stream dissection. Soil parent material is frost shattered glacial till and colluvium derived from hard crystalline rocks such as granite.

Accessory Characteristics: Vegetation is alpine turf or sparse to dense upper subalpine and lower subalpine forest. Elevation ranges from 1981 to 2987 meters (6500 to 9800 feet). Mean annual precipitation is greater than 125 centimeters (50 inches). Slopes ranges from 0 to 20 percent.

LTA Components: This landtype association has two components:

Soils on rounded ridgetops in forest are Typic and Dystric Cryochrepts. They are deep, moderately coarse textured, rocky, and have low fertility and water holding capacity. Rock outcrop makes up five percent of this component. The dominant potential natural vegetation is the subalpine fir, and subalpine fir-whitebark pine series. This component makes up 70 percent of this LTA.

Soils on rounded ridgetops with alpine turf are Dystric Cryochrepts. They are moderately deep, coarse textured, rocky, and have low fertility and water holding capacity. Rock outcrop makes up 20 percent of this component. A common potential natural vegetation series is Idaho fescue. This component makes up 30 percent of this LTA.

Compiled by: Henry Shovic, Gallatin National Forest

LTA73-M332D
LTA73-M332E

FROST SHATTERED MOUNTAIN RIDGE TOPS, VOLCANICS

Location: This LTA is located in the Gravelly, Fleecer, Boulder, Elkhorn, and Anaconda-Pintlar (Beaverhead Mountains) Ranges of southwest Montana, in the Jefferson and Madison River basins on the Beaverhead-Deerlodge National Forest.

Acreage by Section

73-M332D	23,449
73-M332E	14,106

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs in a relatively high elevation, gently to moderately sloping mountain landscape setting at or above the zone of moderate and strong frost churning. The unit is typically composed of frost shattered ridges and slopes, ranging from patterned ground to soil heaving. Parent materials are colluvium and residuum from mostly Tertiary volcanic rocks and volcaniclastic rocks, including andesite, dacite, and rhyolite, welded and non-welded tuffs, and locally minor metagabbro dikes.

Accessory Characteristics: The primary soils are shallow to moderately deep, channery loams and sandy loams. The vegetation is mostly subalpine coniferous forest. Mean annual precipitation ranges from 41 to 76 centimeters (16 to 30 inches). The elevation range of this LTA is 2134 to 2896 meters (7000 to 9500 feet). The dominant slopes have gradients of 5 to 20 percent. This LTA is weakly dissected by streams, with the dominant stream pattern being dendritic, or is undissected. Wetlands, lakes, and ponds are a minor component of this LTA.

LTA Components: This landtype association consists of frost shattered slopes and ridges.

Frost shattered slopes and ridges are formed in colluvium and residuum derived from volcanic rocks comprised mostly of rhyolite, welded tuffs, and andesite. Slope gradients range from 5 to 50 percent. Soils on these landforms are shallow to moderately deep, weakly to moderately developed, well drained channery loams and sandy loams and extremely cobbly loams. These soils are classified as Lithic and Typic Cryoboralfs, Lithic and Typic Cryochrepts, and Typic Cryoborolls. Rock outcrop occurs on about 10 percent of this landscape component. On the Helena NF, up to 25 percent of the unit is scree. The dominant potential natural vegetation is whitebark pine-subalpine fir, rough fescue, and Idaho fescue series. This component represents 100 percent of this LTA.

Compiled by: Dan Svoboda, Beaverhead-Deerlodge National Forest

LTA74-M332D
LTA74-M332E
LTA74-M331A

FROST SHATTERED MOUNTAIN RIDGE TOPS: SANDSTONES AND SHALES

Location: This LTA is located in the Pioneers, Fleecers, Beaverhead Mountains, (south), Tendoys, Tobacco Roots, Gravellys, and Madison Ranges in southwest Montana in the Jefferson and Madison River Basins.

Acreage by Section

74-M332D	859
74-M332E	70,884
74-M331A	9,208

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs in a relatively high elevation, gently to moderately sloping mountain landscape setting, at or above the zone of moderate and strong frost shattering. The unit is typically composed of frost churned ridges and slopes, ranging from patterned ground to soil heaving. Parent materials are colluvium and residuum from Tertiary sediments consisting of shale, siltstone, sandstone, limestone, and calcareous clays. Minor gypsum, chert, and volcanic rocks occur.

Accessory Characteristics: The primary soils are very shallow to moderately deep silt loams, loams and clay loams. The vegetation is a mosaic of alpine turf, alpine and subalpine coniferous forest, and mountain grasslands. Mean annual precipitation ranges from 41 to 127 centimeters (16 to 50 inches). The elevation range of this LTA is 2286 to 3048 (7500 to 10000 feet). The dominant slopes have gradients of 10 to 40 percent. This LTA is slightly dissected by streams, with the dominant stream pattern being dendritic. Wetlands, lakes, and ponds are a minor component of this LTA.

LTA Components: This landtype association consists of frost shattered ridges and slopes.

Frost shattered ridges and slopes are formed in colluvium and residuum derived from sandstones and shales. Slope gradients range from 10 to 50 percent. Soils on these landforms are very shallow to moderately deep, weakly to moderately well developed, silt loams, loams, and clay loams. The surface soils can be highly organic above 9000 feet (2743 meters). These soils are classified as Lithic Cryoborolls and Typic Cryoborolls, Typic Cryochrepts, and Mollic Cryoboralfs. Rock outcrop occurs on about 5 percent of this landscape component. The dominant potential natural vegetation is Idaho fescue, sedge, whitebark pine-subalpine fir, and Douglas-fir series. This component represents 95 percent of this LTA.

Compiled by: Dan Svoboda, Beaverhead-Deerlodge National Forest

LTA75-M332D

FROST SHATTERED MOUNTAIN RIDGE TOP: CALC-SILICATES AND QUARTZITES

Location: This LTA is located in the Little Belt Mountains on the Lewis and Clark Forest.

Acreage by Subsection

75-M332D	36,716

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs on mountain ridge top flats and consists of very old, clayey alluvial or glacial deposits of unknown origin overlying sandstone or quartzite beds. Soils may be wet for extended periods of time and develop perched water tables.

Accessory Characteristics: Primary soils are very strongly developed topsoils 12 to 20 inches deep and contain 15 to 35 percent angular quartzite cobbles. Soils are underlain by confining quartzite bedrock at depths of 60 inches or greater. Subsoils are heavy clay and slowly permeable to water. Mean annual precipitation ranges from 64 to 76 centimeters (25 to 30 inches). The elevation range of this LTA is 1676 to 2286 meters (5500 to 7500 feet). The unit is only slightly dissected by streams with the dominant stream pattern being dendritic. Wetlands are a major component of the unit.

LTA Components: This landtype association consists of mountain ridgetops.

Gently sloping mountain ridgetops parallel the dip of underlying sandstone or quartzite beds. Landforms have slope gradients that range from 0 to 25 percent. Soils on these landforms are strongly developed and consist of loam topsoils, 12 to 20 inches thick, with mottles of reddish-brown color. Subsoils are a dark brown clay. Soils are classified as Aquic Cryoboralfs. Rock outcrop ocurrs on 5 percent of this landscape component. The dominant potential natural vegetation is subalpine fir and spruce series. This component represents 100 percent of this LTA.

Compiled by: Robin Strathy, Lewis and Clark National Forest

LTA81-M332D
LTA81-M332E

LOW RELIEF HILLS: WEATHERED GRANITICS

Location: This LTA is located in the Boulder and Highland Mountains on the Beaverhead-Deerlodge National Forest in southwest Montana. It occurs in the upper Jefferson River and Clark Fork River Basins.

Acreage by Section:

M332D	106,587
M332E	77,434

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountain landscape setting, which is typically composed of rolling uplands. Parent materials are residuum and colluvium underlain by weathered granitic bedrock.

Accessory Characteristics: The primary soils are shallow to deep with gravelly sandy and loamy textures. The vegetation is coniferous forest and a mosaic of shrublands and grasslands and coniferous forest. Small areas of aspen are common. Mean annual precipitation ranges from 30 to 76 cms. (12 to 30 inches). The elevation range of this LTA is 1373 to 2591 meters (4500 to 8500 feet). The dominant slopes have gradients of 5 to 30 percent. This LTA is moderately or highly dissected by streams, with the dominant stream pattern being parallel or dendritic. Wetlands are a major component in this LTA.

LTA Components: This landtype association consists of two landform components: rolling uplands and alluvial flats.

Rolling uplands are formed in weathered quartz monzonite and similar coarse-grained igneous rocks of the Boulder Batholith. Slope gradients range from 0 to 40 percent. Soils on these landforms are shallow, moderately deep, to deep; are weakly to moderately developed, and have sandy loam, gravelly sandy loam and loamy sand surface soils. The subsurface layers are gravelly sandy loams, gravelly loamy sands and loamy sands in the less developed soils; and gravelly sandy clay loams and sandy clay loams where subsoil clay accumulation occurs. Ustochrepts, Eutroboralfs and Haploborolls prevail at the lower elevations. Typic and Lithic Cryochrepts, Cryoboralfs and Cryoborolls dominate at the mid to high elevations. Rock outcrop occurs on 5 to 15 percent of this landscape component. Boulders are scattered on the surface on parts of the unit. The dominant potential natural vegetation is Idaho fescue, sagebrush, Douglas-fir, and subalpine fir series. This component represents 80 percent of this LTA.

Alluvial flats are formed in granitic alluvium and weathered granitic bedrock. Slope gradients range from 0 to 15 percent. Soils on these landforms are deep, weakly developed, with gravelly loamy textures. These soils are classified as Oxyaquic and Typic Cryochrepts and Cryoborolls. Rock outcrop does not occur on this landscape component. The dominant potential natural vegetation is willow, sedge, spruce, and subalpine fir series. This component represents 20 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest.

LTA82-M332D
LTA82-M332E

LOW RELIEF HILLS: VOLCANICS

Location: This LTA is located in the Boulder Mountains on the Beaverhead-Deerlodge Forest in southwest Montana. It occurs in the upper Clark Fork River basin.

Acreage by Section

82-M332D	13,249
82-M332E	6,817

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountain landscape setting, which is typically composed of rolling hills. Parent materials are residuum underlain by Tertiary and Cretaceous volcanic bedrock, including andesite, rhyolite, and welded and non-welded rhyolite and felsic tuffs.

Accessory Characteristics: The primary soils are shallow, moderately deep and deep loamy soils often with high cobble contents. The vegetation is coniferous forest and a mosaic of coniferous forest and shrubland/grassland. Mean annual precipitation ranges from 38 to 75 cms. 15 to 30). The elevation range of this LTA is 1525 to 2135 meters (5000 to 7000). The dominant slopes have gradients of 5 to 30 percent. This LTA is slightly to moderately dissected by streams with the dominant stream patterns being parallel. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of one landform component: rolling hills.

Rolling hills are formed in colluvium and residuum over a variety of volcanic bedrock. Slope gradients range from 5 to 30 percent. Soils on these landforms are shallow, moderately deep and deep to bedrock. They are moderately and weakly developed with cobbly and very cobbly loam surface textures. The subsurface layers are cobbly and very cobbly loams and clay loams. These soils are classified as Typic and Lithic Cryochrepts and Cryoborolls, and Typic and Mollic Cryoboralfs. Rock outcrop occurs on about 10 percent of this landscape component. The dominant potential natural vegetation is Idaho fescue, sagebrush, Douglas-fir, and subalpine fir series. This component represents 100 percent of this LTA.

Compiled by: Dave Ruppert, Beaverhead-Deerlodge National Forest.

LTA83-M332D
LTA83-M332C

LOW RELIEF HILLS: FINE TERTIARY SEDIMENTS

Location: This LTA is located on the Lewis and Clark National Forest. It occurs mostly in the Little Belt Mountains with minor amounts in the Rocky Mountain Front.

Acreage by Section

83-M332D	95,156
83-M332C	329

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a low relief hills setting, which is typically composed of old clayey deposits. Parent materials are residuum underlain by sedimentary rocks, usually sandstones and shales.

Accessory Characteristics: The primary soils are moderately deep with loamy and clayey textures. The vegetation is coniferous forest. Mean annual precipitation ranges from 51 to 76 centimeters (20 to 30 inches). The elevation range of this LTA is 1676 to 2286 meters (5500 to 7500 feet). The dominant slopes have gradients of 0 to 25 percent. This LTA is moderately dissected by streams, with the dominant stream pattern being parallel. Wetlands are a minor component of this LTA.

LTA Components: This landtype association consists of old clayey alluvial deposits.

Old clayey alluvial deposits are formed in sandstone and shale sedimentary rocks. Slope gradients range from 0 to 25 percent. Soils on these landforms are moderately deep, strongly developed, with loamy and clayey textures. These soils are classified as Aquic Cryoboralfs. Rock outcrop generally is not found in this landscape component. The dominant potential natural vegetation is alpine fir habitat types. This component represents 100 percent of this LTA.

Compiled by: Robin Strathy, Lewis and Clark National Forest

LTA90-M332Dg
LTA90-M332Dh

MASS WASTED SLOPES: MIXED GEOLOGY

Location: This LTA in the Big Belt Mountains of the Missouri River basin.

Acreage by Subsection

90-M332Dg	2,678
90-M332Dh	6,222

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountainous landscape setting, which is typically composed of mountain slopes and ridges. Parent materials are old landslide deposits underlain by highly weathered volcanic, limestone and/or metasedimentary rock.

Accessory Characteristics: The primary soils are very deep and have clayey subsoils. The vegetation is coniferous forest and/or mountain grassland. Mean annual precipitation ranges from 50 to 63 centimeters (20 to 25 inches). The elevation range of this LTA is 1678 to 2012 meters (5500 to 6600 feet). The dominant slopes have gradients of 10 to 40 percent. This LTA is moderately to highly dissected by streams, with the dominant stream pattern being deranged. Wetlands are a major component of this LTA.

LTA Components: This landtype association consists of landslides.

Landslides are formed in landslide deposits associated with highly weathered volcanic, limestone and/or metasedimentary bedrock. Slope gradients range from 10 to 40 percent. Soils on these landforms are very deep and well developed. They have moderately fine textured surface layers and high subsoil clay accumulations. They typically have silty clay loam or silt loam surface textures. Subsoils are silty clay loam and silty clay with more than 35 percent rock (mostly gravel and cobble). These soils are classified as Mollic Cryoboralfs. Argic Cryoborolls are associated with mountain grasslands. Inclusions of Typic Cryaquolls are in bogs. The dominant potential natural vegetation is subalpine fir on northerly aspects. Douglas-fir and subalpine fir series are often on warmer aspects. The dominant potential natural vegetation in the grassland areas is rough fescue.

Compiled by: Larry Laing, Helena National Forest

LTA90-M332D
LTA90-331D
LTA90-M332C

MASS WASTED SLOPES: MIXED GEOLOGY

Location: This LTA is located primarily in the Little Belt and Big Snowy Mountain Ranges on the Lewis and Clark Forest.

Acreage by Section

90-M332D	64,947 (Section except for M332Dg and M332Dh)
90-331D	2,563
90-M332C	67,245

LTA Setting and General Characteristics:

Differentiating Characteristics: This LTA occurs in a mountainous landscape setting, which is typically composed of valley sideslopes and benchy lower valley slopes. The primary parent material is shale, but some undifferentiated material is also present.

Accessory Characteristics: The primary soils are deep, clayey and loamy-skeletal silt loams and silty clay loams. The vegetation is coniferous forest. Mean annual precipitation is 51 to 76 centimeters (20 to 30 inches). The elevation range of this LTA is 1350 to 2100 meters (4500 to 7000 feet). The dominant slopes have gradients of 10 to 40 percent. This LTA is moderately dissected, with the dominant stream pattern being dendritic.

LTA Components: This landtype association consists of rotational slumps and mud flows, benchy lower valley slopes, and upper valley sideslopes.

Rotational slumps and mud flows are formed shale. Slope gradients range from 10 to 40 percent. Soils on these landforms are moderately deep, weakly developed, and consist of mainly of loam, silt loam, and cobble. The major soils are classified as Typic Cryochrepts. Rock outcrop occurs on less than 15 percent of this LTA. The dominant potential natural vegetation is subalpine fir. This component represents 55 percent of this LTA.

Benchy lower valley slopes are formed in shale. Slope gradients range from 10 to 40 percent. Soils on these landforms are moderately deep and deep, weakly developed, and consist of loam, silt loam and gravel. The major soils are classified as Typic Cryoboralfs. Rock outcrop occurs on less than 15 percent of this LTA. The dominant potential natural vegetation is Douglas-fir. This component represents 30 percent of this LTA.

Upper valley sideslopes are formed in shale. Slope gradients range from 10 to 25 percent. Soils on these landforms are shallow, moderately developed and consist mainly of loam and cobble. The major soils are classified as Mollic Cryoboralfs. Rock outcrop occurs on less than 15 percent of this LTA. The dominant potential natural vegetation is Douglas-fir. This component represents 15 percent of this LTA.

Compiled by: Richard Saunders and Robin Strathy, Lewis and Clark National Forest

LTA92-M332D
LTA92-M332B
LTA92-M332E

COLLUVIAL SLOPES: MIXED GEOLOGY

Location: This LTA is located throughout the Helena National Forest.

Acreage by Section

92-M332D	12,928
92-M332B	6,383
92-M332E	3,557

LTA Setting and General Characteristics

Differentiating Characteristics: This LTA occurs in a mountainous landscape setting, which is typically composed of mountain slopes and ridges. Parent materials are colluvial deposits, in basins and on toeslopes, typically influenced by metasedimentary and volcanic rocks.

Accessory Characteristics: The primary soils are very deep and have loamy or clayey subsoils. The vegetation is coniferous forest. Mean annual precipitation ranges from 38 to 75 centimeters (15 to 30 inches). The elevation range of this LTA is 1464 to 2135 meters (4800 to 7000 feet). The dominant slopes have gradients of 10 to 50 percent. This LTA is highly dissected but weakly incised by streams, with the dominant stream pattern being parallel or subparallel. Wetlands are a major inclusion in this LTA.

LTA Components: This landtype association consists of colluvial deposits.

Colluvial deposits are derived from metasedimentary and volcanic rock. Some areas are also influenced by limestone colluvium. Slope gradients range from 10 to 50 percent. Soils on these landforms are very deep and weakly to well developed. They have moderately fine textured surface layers and high subsoil clay accumulations. They typically have very cobbly loam or cobbly silt loam surface textures. Subsoils are very cobbly loam, clay loam or silty clay loam. These soils are classified as Typic Cryochrepts, Typic Cryoboralfs, and Argic Cryoborolls. Inclusions of Aquic Cryoborolls, Aquic Cryoboralfs and Typic Cryaquepts are associated with seeps and springs. The dominant potential natural vegetation is subalpine fir, spruce and Douglas-fir.

Compiled by: Larry Laing, Helena National Forest