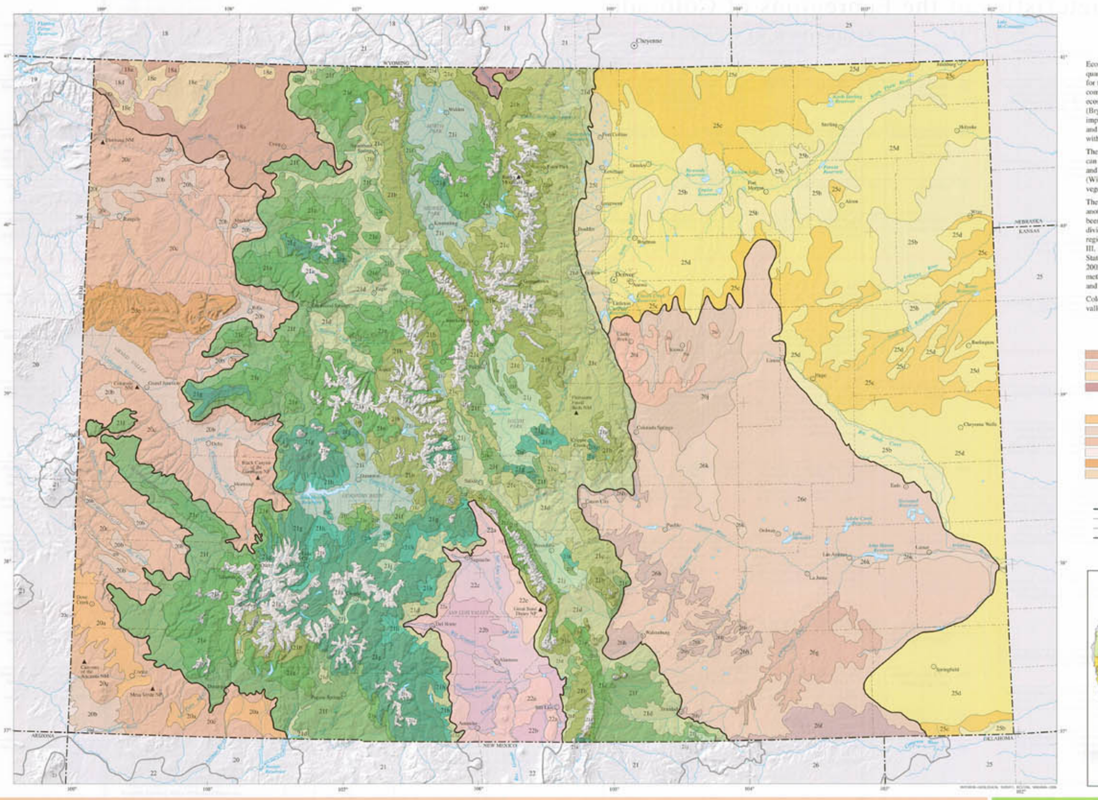
Ecoregions of Colorado



Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. By recognizing the spatial differences in the capacities and potentials of ecosystems, ecoregions stratify the environment by its probable response to disturbance (Bryce and others, 1999). These general-purpose regions are critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernment organizations that are responsible for different types of resources within the same geographical areas (Omernik and others, 2000).

The approach used to compile this map is based on the premise that ecological regions can be identified through the analysis of the spatial patterns and the composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity (Wiken, 1986; Omernik, 1987, 1995). These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology.

The relative importance of each characteristic varies from one ecological region to another, regardless of the hierarchical level. A Roman numeral hierarchical scheme has been adopted for different levels of ecological regions. Level I is the coarsest level, dividing North America into 15 ecological regions. Level II divides the continent into 52 regions (Commission for Environmental Cooperation Working Group, 1997). At level III, the continental United States contains 104 ecoregions and the conterminous United States has 84 ecoregions (United States Environmental Protection Agency [USEPA], 2003). Level IV is a further subdivision of level III ecoregions. Explanations of the methods used to define the USEPA's ecoregions are given in Omernik (1995), Omernik and others (2000), Griffith and others (1994), and Gallant and others (1989, 1995).

Colorado contains arid canyons, semiarid shrub- and grass-covered plains, alluvial valleys, lava fields and volcanic plateaus, woodland- and shrubland-covered hills, forested mountains, glaciated peaks, wetlands, and a variety of aquatic habitats. Ecological diversity is enormous. There are 6 level III ecoregions and 35 level IV ecoregions in Colorado, and many continue into ecologically similar parts of adjacent states.

The level III and IV ecoregion map on this poster was compiled at a scale of 1:250,000 and depicts revisions and subdivisions of earlier level III ecoregions that were originally compiled at a smaller scale (USEPA, 2003; Gallant and others, 1989; Omernik, 1987). This poster is part of a collaborative project primarily between USEPA Region X, USEPA National Health and Environmental Effects Research Laboratory (Corvallis, Oregon), Colorado Department of Public Health and Environment (CDPHE), Colorado Division of Wildlife (CDOW), United States Department of Agriculture–Forest Service (USFS), United States Department of Agriculture–Natural Resources Conservation Service (NRCS), United States Department of the Interior–Bureau of Land Management (BLM), and United States Department of the Interior–Geological Survey (USGS)–National Center for Earth Resources Observation and Science (EROS).

The project is associated with an interagency effort to develop a common framework of ecological regions. Reaching that objective requires recognition of the differences in the conceptual approaches and mapping methodologies applied to develop the most common ecoregion-type frameworks, including those developed by the USFS (Bailey and others, 1994), the USEPA (Omernik, 1987, 1995), and the NRCS (U.S. Department of Agriculture–Soil Conservation Service, 1981). As each of these frameworks is further refined, their differences are becoming less discernible. Regional collaborative projects, such as this one in Colorado, where agreement has been reached among multiple resource management agencies, are a step toward attaining consensus and consistency in ecoregion frameworks for the entire nation.

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18 Wyoming Basin
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Level III ecoregion
Level IV ecoregion
County boundary
State boundary

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SCALE 1:1 200 000

15 10 5 0 30 60 mi

30 20 10 0 60 120 km

Albers equal area projection
Standard parallels 38° N and 40° N

Level III Ecoregions of the Conterminous United States

1 Coast Range; 2 Puget Lowland; 3 Willamette Valley; 4 Cascades; 5 Sierra Nevada; 6 Southern and Central California Chaparral and Oak Woodlands; 7 Central California Valley; 8 Southern California Mountains; 9 Eastern Cascades Slopes and Foothills; 10 Columbia Plateau; 11 Blue Mountains; 12 Snake River Plain; 13 Central Basin and Range; 14 Mojave Basin and Range; 15 Northern Rockies; 16 Idaho Batholith; 17 Middle Rockies; 18 Wyoming Basin; 19 Wasatch and Uinta Mountains; 20 Colorado Plateaus; 21 Southern Rockies; 22 Arizona/New Mexico Plateau; 23 Arizona/New Mexico Mountains; 24 Chihuahuan Deserts; 25 High Plains; 26 Southwestern Tablelands; 27 Central Great Plains; 28 Flint Hills; 29 Central Oklahoma/Texas Plains; 30 Edwards Plateau; 31 Southern Texas Plains; 32 Texas Blackland Prairies; 33 East Central Texas Plains; 34 Western Gulf Coastal Plain; 35 South Central Plains; 36 Ouachita Mountains; 37 Arkansas Valley; 38 Boston Mountains; 39 Ozark Highlands; 40 Central Irregular Plains; 41 Canadian Rockies; 42 Northwestern Glaciated Plains; 43 Northwestern Great Plains; 44 Nebraska Sand Hills; 45 Piedmont; 46 Northern Glaciated Plains; 47 Western Corn Belt Plains; 48 Lake Agassiz Plain; 49 Northern Minnesota Wetlands; 50 Northern Lakes and Forests; 51 North Central Hardwood Forests; 52 Driftless Area; 53 Southeastern Wisconsin Till Plains; 54 Central Corn Belt Plains; 55 Eastern Corn Belt Plains; 56 Southern Michigan/Northern Indiana Drift Plains; 57 Huron/Erie Lake Plains; 58 Northeastern Highlands; 59 Northeastern Coastal Zone; 60 Northern Appalachian Plateau and Uplands; 61 Erie Drift Plain; 62 North Central Appalachians; 63 Middle Atlantic Coastal Plain; 64 Northern Piedmont; 65 Southeastern Plains; 66 Blue Ridge; 67 Ridge and Valley; 68 Southwestern Appalachians; 69 Central Appalachians; 70 Western Allegheny Plateau; 71 Interior Plateau; 72 Interior River Valleys and Hills; 73 Mississippi Alluvial Plain; 74 Mississippi Valley Loess Plains; 75 Southern Coastal Plain; 76 Southern Florida Coastal Plain; 77 North Cascades; 78 Klamath Mountains; 79 Madrean Archipelago; 80 Northern Basin and Range; 81 Sonoran Basin and Range; 82 Laurentian Plains and Hills; 83 Eastern Great Lakes and Hudson Lowlands; 84 Atlantic Coastal Pine Barrens

Map Source: USEPA, 2003

Colorado Department of Public Health and Environment

18. Wyoming Basin

The Wyoming Basin (18) contains a diverse mix of arid basins, badlands, and foothills.

This ecoregion is a broad intermontane basin, interrupted by high hills and low mountains, and dominated by relatively arid grasslands and shrublands. Nearly surrounded by forest-covered mountains, the region is somewhat drier than the Northwestern Great Plains (43) to the northeast and lacks the extensive cover of pinyon-juniper woodland found in the Colorado Plateaus (20) to the south. Much of the region is used for livestock grazing, although many areas lack sufficient forage to adequately support this activity. The region contains major natural gas and petroleum producing fields. The Wyoming Basin also has extensive coal deposits along with areas of trona, bentonite, clay, and uranium mining.

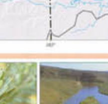
18a The semiarid **Rolling Sagebrush Steppe** is a vast region of rolling plains, alluvial and outwash fans, hills, cuestas, mesas, and terraces. This region is less hilly than the Foothill Shrublands and Low Mountains (18d) ecoregion. Annual precipitation of 10 to 20 inches varies with elevation and proximity to mountains. The sagebrush steppe natural vegetation includes western wheatgrass, needle-and-thread, blue grama, Sandberg bluegrass, Junegrass, rabbitbrush, fringed sage, Wyoming big sagebrush, silver and black sagebrush in lowlands, and mountain big sagebrush in the higher elevations. Land use is mainly rangeland, with some areas of cropland along the Yampa River in hay, wheat, barley, or oats. Oil, gas, and coal deposits are scattered throughout the region.

18d The **Foothill Shrublands and Low Mountains** ecoregion includes isolated dry mountain ranges and foothill slopes, and in Colorado includes Cold Spring Mountain, Bishop Peak, Diamond Peak, and Lookout Mountain. The topography of this region is more rugged than the Rolling Sagebrush Steppe (18a). Tertiary sedimentary rocks of sandstone and conglomerate are extensive, but shale, siltstone, and limestone also occur. Big sagebrush, rabbitbrush, pricklypear, bluebunch wheatgrass, and Idaho fescue dominate on fine-textured soils; Rocky Mountain juniper, Utah juniper, and mountain mahogany woodlands occur on rock outcrops. Land use is mostly rangeland and wildlife habitat.

18e The arid **Salt Desert Shrub Basins** ecoregion includes disjunct playas and isolated sand dunes. The plains, terraces, and rolling alluvial fans of Ecoregion 18e have soils that tend to be more alkaline and less permeable than soils in the Rolling Sagebrush Steppe (18a). Vegetation is a sparse cover of arid land shrubs such as shadscale, greasewood, and Gardner's saltbush, with some areas of big sagebrush. Areas with stabilized sand dunes are dominated by alkali cordgrass, Indian ricegrass, blowout grass, alkali wildrye, and needle-and-thread. Land use is rangeland and wildlife habitat. This arid region is sensitive to grazing pressure, which may promote the invasion of weeds such as Russian thistle, cheatgrass, and the toxic halogeton.

18f The **Laramie Basin** ecoregion is a wide intermontane valley of Wyoming that extends slightly into northern Colorado. Elevations in the Colorado portion are generally 7800 to 9100 feet, with annual precipitation of 15 to 20 inches. For the region as a whole, natural vegetation is mainly grassland compared to the sagebrush steppe in other regions of Ecoregion 18. Needle-and-thread, western wheatgrass, blue grama, Indian ricegrass, and other mixed grass species are typical, along with rabbitbrush, fringed sage, and various forb and shrub species. The rolling, high elevation valley of grass and shrubland is used primarily for seasonal livestock grazing. Some hay is produced along the Laramie River.

Big sagebrush is an important winter browse plant for wildlife species, including mule deer, sage grouse, pronghorn, and many small mammals.



Water depletions and nonnative fish of the Yampa River are affecting the survival of native fish populations.

Sage grouse are an important indicator species, requiring a diversity of grasses and forbs and healthy riparian areas.

The black-footed ferret, one of the continent's most endangered mammals, is being reintroduced in parts of Ecoregions 18 and 20.

20. Colorado Plateaus

Deep canyons, sheer cliffs, plateaus, and some broad basins and valleys add to the landscape diversity of Ecoregion 20. Horizontal beds of sandstone and shale are seen in many parts of the region, including here at Colorado National Monument in 20c. In the background, the Grand Valley portion of 20b can be seen.

The Gunnison Gorge area in 20c is known for its white-water boating, world-class trout fishery, and areas of wilderness. Public land management issues include instream river flows, native vs. sports fisheries, grazing and mining impacts, control of invasive plants such as tamarisk, and balancing resource protection with increasing human use.

Canyons, mesas, plateaus, and mountains of the Colorado Plateaus expose a long geologic history of rock formations in Colorado. Rugged tableland topography is typical of the ecoregion. Precipitous side-walls mark abrupt changes in local relief, often of 1000 to 2000 feet or more. The region contains more pinyon-juniper and Gambel oak woodlands than the Wyoming Basin (18) to the north. However, the Colorado Plateaus ecoregion also has large low-lying areas containing saltbrush and greasewood (typical of hotter, drier areas) which are generally not found in the Arizona/New Mexico Plateau (22) to the south where grasslands are more common.

20a Parts of the gently sloping **Monticello-Cortez Uplands and Sagebrush Valleys** ecoregion are covered by eolian material. Deep, silty soils are typical and retain enough available moisture to naturally support Wyoming big sagebrush and associated grasses. These soils now sustain dryland farming, with more irrigated agriculture to the east. Crops include pinto beans, Anasazi beans, winter wheat, oats, and alfalfa. Shallow or stony soils occur along the rims of benches and minor escarpments and support pinyon-juniper woodland.

20b The arid **Shale Deserts and Sedimentary Basins** ecoregion consists of nearly level basins and valleys, benches, low rounded hills, and badlands. Rock outcrops occur. It is sparsely vegetated with mat saltbush, bud sagebrush, galleta grass, and desert trumpet. Floodplains have alkaline soils that support greasewood, alkali sacaton, seepweed, and shadscale. Scattered, gravel-capped benches occur and protrude from the present denudational surface because they are more resistant to erosion than the surrounding shales. Soils are shallow and types range from clayey to silty. Soils that formed primarily on Mancos shale are found in the areas northwest of Rangley, east of Meeker, in the Grand Valley, in Dry Creek Basin and Disappointment Valley southwest of the Uncompahgre Plateau, and in southwest Colorado near the Mancos River. The Mancos shale basins have the potential for high selenium levels, a particular problem in areas with irrigated agriculture. Soils formed from sandstone, limestone, shale, and gypsum are found in Paradox and Big Gypsum valleys southwest of the Uncompahgre Plateau. Soils formed from claystone, shale, sandstone, and mudstone are found west of Meeker, and in the Colorado River valley near Rifle. Land use includes rangeland, pastureland, and dryland and irrigated cropland, with winter wheat, small grains, forage crops, and pinto beans as major crops. The valleys of the Gunnison and Colorado rivers have areas favorable for growing apples, peaches, pears, and apricots. Shrublands provide important winter habitat for wildlife.

20c Broad, grass-, shrub-, and woodland-covered benches and mesas characterize the **Semiarid Benchlands and Canyonlands** ecoregion. Areas of high relief alternate with areas of low relief. Low escarpments separate remnant mesa tops and narrow canyons from surrounding benches. Bedrock exposures (e.g., slickrock and fins) are common along rims, escarpments, and on steep dip slopes. Deep eolian soils are composed of fine sand and support warm season grasses, winterfat, Mormon tea, fourwing saltbush, and blue grama. Two-needle pinyon and Utah juniper occur on shallow, stony soils. Scattered areas of Gambel oak occur at higher elevations. Fire suppression and erosion have allowed this woodland to expand beyond its original range. Overall, the vegetation is not as sparse as in drier areas such as Ecoregions 20b and 20d. Average annual precipitation in the Colorado portion of the region varies from 10 to 18 inches in lower areas; on the highest sites, such as Mesa Verde, 20 to 25 inches can occur. Livestock grazing is a dominant land use, although stock carrying capacity is limited. On floodplains and terraces, some irrigated cropland occurs, primarily hay and grain for livestock. Oil and natural gas wells, oil shale extraction, and coal mining are also present in the region.

20d Occurring primarily in Utah, the **Arid Canyonlands** ecoregion includes the inner gorge of the Colorado River and its major tributaries. Much of this ecoregion is bounded by nearly vertical canyon walls that separate it from the adjacent, higher benchlands of Ecoregion 20c. Soils are shallower and have a drier moisture regime than those of Ecoregions 20a and 20c. Exposed bedrock is common. Blackbrush, shadscale, and drought-tolerant grasses including galleta grass and Indian ricegrass occur. Blackbrush is more common here than in Ecoregion 20c, where pinyon-juniper woodland and sagebrush dominate. Annual precipitation is lowest in the deepest canyons, mostly less than 10 inches. Land use is mostly livestock grazing and recreation.

20e The **Escarpments** ecoregion is characterized by extensive, deeply-dissected, cliff-bench complexes that ascend dramatically from Ecoregions 20b or 20c to the forested mountain rim. Local relief can be as great as 3000 feet, and the region is prone to landslides. Ecoregion 20e includes major scarp slopes of the Book Cliffs and Roan Cliffs. Natural vegetation varies according to aspect and moisture availability, ranging from Douglas-fir forest on steep, north-facing slopes at higher elevations to desert and semidesert grassland or shrubland on lower, drier sites. Pinyon-juniper woodland often dominates escarpments and benches that are covered by shallow soils. This rugged, remote, and varied landscape provides habitat for wildlife.

20f Occurring primarily in Utah, the **Uinta Basin Floor** ecoregion lies in a large synclinal basin enclosed by the Uinta Mountains and Tavaputs Plateau. Precipitation is low and soils are arid. Winters are constantly cold and often foggy due to frigid, dense air draining from the adjacent uplands and resultant air temperature inversions. Saltbrush-greasewood is the natural vegetation type. Ecoregion 20f is distinguished from other arid basins by the abundant stream runoff it receives from the mountains in Utah. Streams are often diverted for irrigation. Alfalfa, small grain, and corn are grown for silage on arable, gently-sloping terraces and valley floors. Stonier soils are irrigated for pasture where and when water is available. Non-irrigated areas are used for livestock grazing.

Mancos shale landscapes can be natural sources for toxic elements such as selenium that affect surface and groundwater.

Pinyon-juniper woodlands occur primarily on warm dry sites in the foothills and on mesa tops.

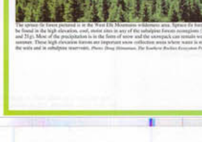
Rock art, or petroglyphs, can be found in parts of Ecoregion 20, such as these figures made by people of the Fremont culture more than a thousand years ago.

Agriculture occurs in many parts of Ecoregion 20c, and the red soils tend to have a high iron content. Dove Creek calls itself "the pinto bean capital of the world."

The roundtail sucker prefers quiet, muddy backwaters of the Colorado River basin. It is endangered due to loss of habitat and predation by nonnative fish.

River recreation such as white-water rafting has increased in recent years in Ecoregion 20.

21. Southern Rockies



The spruce-fir forest pictured is in the West Elk Mountains wilderness area. Spruce-fir forests can be found in the high elevation, cool, moist sites in any of the subalpine forests ecoregions (21b, 21e, and 21g). Most of the precipitation in the form of snow and the snowpack can remain well into the summer. These high elevation forests are important snow collection areas and the water is stored in the soils and in subalpine reservoirs.

The Southern Rockies are composed of high elevation, steep, rugged mountains. Although coniferous forests cover much of the region, as in most of the mountainous regions in the western United States, vegetation, as well as soil and land use, follows a pattern of elevational banding. The lowest elevations are generally grass or shrub covered and heavily grazed. Low to middle elevations are also grazed and covered by a variety of vegetation types including Douglas-fir, ponderosa pine, aspen, and juniper-oak woodlands. Middle to high elevations are largely covered by coniferous forests and have little grazing activity. The highest elevations have alpine characteristics. The region includes the Colorado Mineral Belt, a broad area stretching northeast from the San Juan Mountains in southwestern Colorado to the Colorado Front Range near Boulder. Most of the historic mining camps of Colorado lie in this area.

21a The **Alpine Zone** occurs on mountain tops above treeline, beginning at about 10500 to 11000 feet. It includes alpine meadows as well as steep, exposed rock and glaciated peaks. Annual precipitation ranges from about 35 to greater than 70 inches, falling mostly as snow. Vegetation includes low shrubs, cushion plants, and wildflowers and sedges in wet meadows. The forest-tundra interface is sparsely colonized by stunted, deformed Englemann spruce, subalpine fir, and limber pine (krummholz vegetation). Rocky Mountain bristlecone pines are also found here, some of the oldest recorded trees in North America. Land use, limited by difficult access, is mostly wildlife habitat and recreation. Ecoregion 21a is snow-free only 8 to 10 weeks annually. Snow cover is a major source of water for lower, more arid ecoregions.

21b The **Crystalline Subalpine Forests** ecoregion occupies a narrow elevational band on the steep, forested slopes of the mountains, becoming more extensive on the north-facing slopes. The elevation range of the region is 8500 to 12000 feet, just below the Alpine Zone (21a). The lower elevation limit is higher in the south, starting at 9000 to 9500 feet. The dense forests are dominated by Englemann spruce and subalpine fir; aspen and pockets of lodgepole pine also occur. Some subalpine meadows also occur. Forest blowdown, insect outbreaks, fire, and avalanches affect the vegetation mosaic. Soils are weathered from a variety of crystalline and metamorphic materials, such as gneiss, schist, and granite, as well as some areas of igneous intrusive rocks. Recreation, logging, mining, and wildlife habitat are the major land uses. Grazing is limited by climatic conditions, lack of forage, and lingering snowpack.

21c The **Crystalline Mid-Elevation Forests** are found mostly in the 7000 to 9000 feet elevation range on crystalline and metamorphic substrates. Most of the region occurs in the eastern half of the Southern Rockies (21). Natural vegetation includes aspen, ponderosa pine, Douglas-fir, and areas of lodgepole pine and limber pine. A diverse understory of shrubs, grasses, and wildflowers occurs. The variety of food sources supports a diversity of bird and mammal species. Forest stands have become denser in many areas due to decades of fire suppression. Land use includes wildlife habitat, livestock grazing, logging, mineral extraction, and recreation, with increasing residential subdivisions.

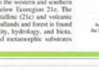
21d The **Foothill Shrublands** ecoregion is a transition from the higher elevation forests to the drier and lower Great Plains (Ecoregions 25, 26) to the east and to the Colorado Plateaus (20) to the west. This semiarid region has rolling to irregular terrain of hills, ridges, and footslopes, with elevations generally 6000 to 8500 feet. Sagebrush and mountain mahogany shrubland, pinyon-juniper woodland, and scattered oak shrublands occur. Other common low shrubs include serviceberry and skunkbush sumac. Interspersed are some grasslands of blue grama, Junegrass, and western wheatgrass. Land use is mainly livestock grazing and some irrigated hayland adjacent to perennial streams.

21e The **Sedimentary Subalpine Forests** ecoregion occupies much of the western half of the Southern Rockies, on sandstone, siltstone, shale, and limestone substrates. The elevation limits of this region are similar to the crystalline (21b) and volcanic (21g) subalpine forests. Stream water quality, water availability, and aquatic biota are affected in places by carbonate substrates that are soluble and nutrient rich. Soils are generally finer-textured than those found on crystalline or metamorphic substrates of Ecoregion 21b, and are also more alkaline where derived from carbonate-rich substrates. Subalpine forests dominated by Englemann spruce and subalpine fir are typical, often interspersed with aspen groves or mountain meadows. Some Douglas-fir forests are at lower elevations.

21f The **Sedimentary Mid-Elevation Forests** ecoregion occurs in the western and southern portions of the Southern Rockies, at elevations generally below Ecoregion 21e. The elevation limits and vegetation of this region are similar to the crystalline (21c) and volcanic (21h) mid-elevation forests; however, a larger area of Gambel oak woodlands and forest is found in this region. Carbonate substrates in some areas affect water quality, hydrology, and biota. Soils are generally finer-textured than those found on crystalline and metamorphic substrates such as those in Ecoregion 21c.

Aspen stands provide important habitat for wildlife. The leaves, twigs, and bark are nutritious for deer, elk, bear, beaver, and other animals.

North American elk, or wapiti, are found in many parts of Ecoregion 21. The bugle calls of bull elk are an autumn hallmark.



The Canada lynx, once near the brink of extinction in Colorado, is being reintroduced into the subalpine forests of the Southern Rockies. Snowshoe hares and red squirrels are its primary prey.

Historical and current mining operations can affect water quality and habitat.

Flatirons of the Fountain Formation and hogbacks of Dakota Sandstone are found in the Foothill Shrublands (21d) in the transition zone between the Great Plains and Rocky Mountains.

21. Southern Rockies (continued)

The Gunnison Basin of Ecoregion 21i has some unique fingerprint characteristics and several endemic plant species.

Alberta Falls in Ecoregion 21b, Rocky Mountain NP.

21g The steep, mountainous **Volcanic Subalpine Forests** ecoregion is composed of volcanic and igneous rocks, predominately andesitic with areas of basalt. The region is found mainly in the San Juan Mountains, which have the most rugged terrain and the harshest winters in the Southern Rockies of Colorado. Smaller areas are found in the West Elk Mountains, Grand Mesa, Flat Tops, and in the Front Range. The area is highly mineralized, and gold, silver, lead, and copper have been mined. Relatively young geologically, the mountains are among the highest and most rugged of North America and still contain some large areas of intact habitat. Englemann spruce, subalpine fir, and aspen forests support a variety of wildlife.

21h The **Volcanic Mid-Elevation Forests** ecoregion occurs at elevations of 7000 to 9000 feet and is composed of igneous rocks of andesite and basalt. The majority of the region is found in the San Juan Mountains, the West Elk Mountains, and in a small area of the Front Range. Forests of ponderosa pine, Douglas-fir, and aspen occur. Land use includes wildlife habitat, livestock grazing, logging, recreation, and mineral extraction of silver and gold.

21i The **Sagebrush Parks** ecoregion contains the large, semiarid, high intermontane valleys that support sagebrush shrubland and steppe vegetation. The ecoregion includes North Park, Middle Park and the Gunnison Basin, and is slightly drier than the Grassland Parks (21j). Summers tend to be hot and winters very cold, with annual precipitation of 10-16 inches. Land use is mostly rangeland and wildlife habitat, with some hay production near streams. The sagebrush provides forage and habitat to many animals and birds. Sandy loam soils are typical, formed in residuum from crystalline and sedimentary rocks, glacial outwash, and colluvial or alluvial materials.

21j The **Grassland Parks** ecoregion also consists of high intermontane valleys similar in elevation to the drier Sagebrush Parks (21i); however, water availability is greater in 21j and the region supports grasslands rather than the sagebrush shrubland and steppe found in 21i. Grasslands with bunchgrasses are dominant, and include Arizona fescue, Idaho fescue, mountain muhly, bluebunch wheatgrass, needle-and-thread, Junegrass, and slender wheatgrass. Springs and wetlands may occur. Some subalpine/montane fens are found where groundwater seepage has persistently reached the surface and supported peatland development. There are only a few trees or shrubs, and if present, they are widely scattered and mature.

The landscapes of the alpine and subalpine ecoregions, here in the upper Animas basin, present beautiful contrasts, with dense spruce-fir forests, flower-studded alpine meadows, snowfields, and rocky peaks.

22. Arizona/New Mexico Plateau

Once containing a more extensive complex of lakes and marshes, the wetlands in Ecoregion 22b still support a high diversity of wetland wildlife.

The San Luis Valley has provided habitat for many migrating bird species. Sandhill cranes are one of the many species utilizing the wetland habitats and barley and grain fields of this ecoregion.

Potatoes are a major crop in Ecoregion 22b, growing well in the loose, loam soil and bright, warm days and cool nights. More than 35 major potato warehouses in the San Luis Valley pack and ship potatoes for the fresh market.

Ecoregion 22b is the major malt barley-producing region in Colorado, grown mostly for a large in-state brewing company. Center pivot irrigation is common, relying on conjunctive use of shallow groundwater and surface water. Nitrate, sulfates, and pesticides in water are a concern in some areas.

The Arizona/New Mexico Plateau represents a large transitional region between the semiarid grasslands and low relief tablelands of the Southwestern Tablelands (26) ecoregion in the east, the drier shrublands and woodland-covered higher relief tablelands of the Colorado Plateaus (20) in the north, and the lower, hotter, less vegetated Mojave Basin and Range (14) in the west and Chihuahuan Deserts (24) in the south. Higher, forest-covered, mountainous ecoregions border the region on the northeast and southwest. Local relief in the Colorado portion is relatively low, but in other parts of the ecoregion relief can be well over 1000 feet. The region in Colorado known as the San Luis Valley forms part of the upper end of the Rio Grande Valley. It is flanked by the Sangre de Cristo Range on the east and the San Juan Mountains on the west. This ecoregion has the lowest annual precipitation in the state, mostly 6 to 12 inches. However, surface runoff from the surrounding mountains and groundwater migrate toward the low point at San Luis Lake, providing a good water supply to the region. Desert and wetlands exist side by side. The north San Luis Valley is a closed basin with no surface outlet to the Rio Grande. The high water table has created many ephemeral lakes, wetlands, springs, and flowing wells, and supports considerable irrigation in the valley. At the western edge of the Central Flyway, the valley wetlands historically provided crucial migratory bird habitat. Water-use issues are a continuing concern as the demand for water grows. Excessive use of surface and groundwater has led to waterlogged soils in some parts of the valley, causing alkaline soils and highly mineralized groundwater from the concentration of salts.

22a The **San Luis Shrublands and Hills** ecoregion includes the higher relief foothill edges and low mountain areas within the basin. It includes the San Luis Hills in the southwest, a rugged mass of hills and tilted mesas. The hills are composed of andesitic volcanic rock and are 500 to 1000 feet higher than the adjacent ecoregions of 22. Vegetation communities represent a transition from the grassland and desert communities of the lower basin to the woodland species found in the surrounding foothills of the Southern Rockies (21). Big sagebrush, rabbitbrush, and winterfat occur, as well as grasslands of western wheatgrass, green needlegrass, blue grama, and needle-and-thread. Areas of pinyon-juniper are found on the tops of the San Luis Hills.

22b Although precipitation in the **San Luis Alluvial Flats and Wetlands** ecoregion is low, less than 8 to 10 inches, water availability from mountain runoff, a high water table, and associated springs and wetlands have made cropland irrigation possible. The ecoregion was once dominated by shadscale, saltbush and greasewood, but most of the native vegetation has been removed for agriculture. Irrigated cropland is common, with barley malt, potatoes, alfalfa, small grains, and hay, and smaller areas of vegetables such as spinach, head lettuce, and carrots. Generally, the soils of this region tend to be less alkaline than the soils of 22c. The increasing demand for water throughout this region is an ongoing issue, exacerbated by recent droughts. Increased salt accumulation in soils and groundwater depletion are problems associated with irrigation and the competing uses of available water.

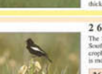
22c The **Salt Flats** ecoregion includes the alkaline basin that surrounds the San Luis Lakes. The smooth to irregular plains of low to moderate relief have elevations ranging from 7400 to 7700 feet, some of the lowest areas in the San Luis Valley. Vegetation is sparse, with greasewood and shadscale dominating along with scattered areas of horsebrush, spiny hopsage, rabbitbrush, saltgrass, alkali sacaton, and small areas of sagebrush at the eastern edges. Some areas are devoid of vegetation. Land use is limited to low density livestock grazing and wildlife habitat. Unlike 22b, cropland is more limited within this region due to the more alkaline soils. Precipitation ranges from 6 to 8 inches annually.

22e Great Sand Dunes National Park and the outlying sand sheets are included in the **Sand Dunes and Sand Sheets** ecoregion. The sand sheets consist of low parabolic and longitudinal dunes that are largely stabilized by scrubby vegetation. The Great Sand Dunes rise up to 750 feet above the basin and are the tallest dunes in North America. The sand was derived mainly from volcanic rock sediments of the San Juan Mountains that were transported by the Rio Grande, and deposited on the alluvial fan on the west side of the valley. The sand was then blown by the prevailing southwesterly winds, piling up at the base of the mountains. The dunes are mostly bare, with patches of Indian ricegrass, blowout grass, or lemon scurfpea. Sand sheet plants include rabbitbrush, sand dropseed, spiny hopsage, sand verbena, and prairie sunflower. Land use in the region is mostly recreation and wildlife habitat, with some limited rangeland.

The Sand Dunes and Sand Sheets (22e) ecoregion has a surprising diversity of plant and animal life, as well as some unique geological and hydrological features. Elk, pronghorn, bison, coyotes, jackrabbits, and small rodents roam, along with a variety of birds, reptiles, and endemic beetles. Streams with a "pulse" or surge flow occur here and in only a few other places in the world.

25. High Plains

Above: Oil and gas wells dot the High Plains.



Top right: Urban and suburban development is spreading across much of the cropland and grasslands of Ecoregion 25l.

The swift fox is home in the prairies of the High Plains. It feeds mostly on jackrabbits, prairie dogs, small rodents, birds, and insects.

Higher and drier than the Central Great Plains (27) to the east, and in contrast to the irregular, mostly grassland or grazing land of the Northwestern Great Plains (43) to the north, much of the High Plains comprises smooth to slightly irregular plains having a high percentage of cropland. Grama-buffalo grass is the potential natural vegetation in this region as compared to mostly wheatgrass-needlegrass to the north, Trans-Pecos shrub savanna to the south, and taller grasses to the east. The northern boundary of this ecological region is also the approximate northern limit of winter wheat and sorghum and the southern limit of spring wheat. In Colorado, gas and oil fields are scattered throughout the region, with the greatest concentration found in the Denver Basin area.

25b The grass-stabilized sand plains, sand dunes and sand sheets of the **Rolling Sand Plains** ecoregion are a divergence from the mostly loess-covered plains of adjacent ecoregions. Sandy soils, formed from eolian deposits, supported a sandsage prairie natural vegetation type, different from the shortgrass and midgrass prairie of other neighboring level IV ecoregions in the High Plains (25). Sand sagebrush, sand bluestem, prairie sandreed, and Indian ricegrass were typical plants. Land use is primarily rangeland, although a few scattered areas have been developed for irrigated cropland using deep wells.

25c The **Moderate Relief Plains** ecoregion is typified by irregular plains with slopes greater than the surrounding flat and rolling plains of Ecoregion 25d. Land use is predominantly rangeland, in contrast to the cropland or mosaic of cropland and rangeland of surrounding ecoregions. Soils are silty and clayey loams, formed from eolian sediments, shallower than the thicker loess-capped uplands of 25d. Blue grama-buffalograss was the natural prairie type.

25d The **Flat to Rolling Plains** ecoregion is more level and less dissected than the adjacent Moderate Relief Plains (25c). Soils are generally silty with a veneer of loess. Dryland farming is extensive, with areas of irrigated cropland scattered throughout the ecoregion. Winter wheat is the main cash crop, with a smaller acreage in forage crops.

25l The **Front Range Fans** ecoregion flanks the northern Front Range of the Southern Rockies in Colorado. Streams tend to be cooler than in other High Plains (25) regions and contain many Front Range aquatic species. The soils of the region have more outwash gravels than regions farther east and occupy old terraces, benches, and alluvial fans. The soils are formed from materials weathered from arkosic sedimentary rock, gravelly alluvium, and red shales and sandstone. Some soils have a high shrink-swell potential. Land use is changing from mostly cropland and rangeland to more extensive urban development. Development has led to an increase in manmade lakes and gravel pits dotting the region.

Shortgrass prairie at Pawnee National Grassland in Ecoregion 25c.

26. Southwestern Tablelands

Mesa de Maya in Ecoregion 26f is a distinct area of basalt-capped tablelands with a unique mix of plains and foothill flora.

The lark bunting, Colorado's state bird, breeds in open grasslands of the Great Plains.

Cattle production is common in Ecoregion 26. Effects of different stocking densities and rotation times can often be seen in fence lines.

Once nearly extinct, the pronghorn is adapted to the grasslands of Colorado's eastern plains, as well as to the shrublands of the mountain parks and western basins. These fast mammals can reach speeds over 60 miles per hour over short distances.

The Southwestern Tablelands flank the High Plains (25) with red hued canyons, mesas, badlands, and dissected river breaks. Unlike most adjacent Great Plains ecological regions, little of the Southwestern Tablelands is in cropland. Much of this region is in sub-humid grassland and semiarid rangeland. The boundary to the east in Colorado represents a transition from the more extensive cropland within the High Plains (25) to the generally more rugged and less arable land within the Southwestern Tablelands (26) ecoregion. The natural vegetation in the Colorado portion of this region is mostly grama-buffalograss, with some juniper-scrub oak-grass savanna on escarpment bluffs.

26e The **Piedmont Plains and Tablelands** ecoregion is a vast area of irregular and dissected plains underlain by shale and sandstone. Precipitation varies from 10 to 16 inches, with the lowest amounts found along the Arkansas River between Pueblo and Las Animas. The shortgrass prairie contains buffalograss, blue grama, western wheatgrass, galleta, alkali sacaton, sand dropseed, sideoats grama, and yucca. Land use is mostly rangeland. Irrigated agriculture occurs along the Arkansas River, and dryland farming is found primarily in the north half of the region.

26f The **Mesa de Maya/Black Mesa** ecoregion contains a broad basaltic mesa and dissected plateaus with steep canyons. Juniper and pinyon-juniper woodlands grow along canyons and mesa sides, while grasslands occur on the basalt cap of the mesa. This is the only region in Colorado where small areas of mesquite are found. Soils are formed from weathered sandstone, basalt, limestone, sandstone, and shale. Rock outcrops are common. Low precipitation, low available water capacity, and erodibility limit agricultural use.

26g The **Purgatoire Hills and Canyons** ecoregion includes dissected hills, canyons, and rock outcrops. Woodland vegetation is dominated by juniper with less grassland vegetation than found in 26f. Unlike Ecoregion 26f, the Purgatoire Hills and Canyons ecoregion is generally more dissected and does not contain the basaltic mesa or soils derived from basalt. Soils are well drained and formed in calcareous eolian sediments and material weathered from sandstone; rock outcrops are common. The Purgatoire River supports a diverse fish assemblage.

26h Scattered, dissected areas with pinyon and juniper on the uplands characterize the **Pinyon-Juniper Woodlands and Savannas** ecoregion. The region is a continuation or an outlier of the pinyon-juniper woodlands found in Ecoregion 21d in the Southern Rocky Mountains to the west. Soils tend to be thin and are formed in materials weathered from limestone, sandstone, and shale. Rock outcrops are common. Annual precipitation varies from 12 to 20 inches, with the highest amounts found in areas closest to the mountains. Land use is mainly wildlife habitat and rangeland.

26i The **Pine-Oak Woodlands** ecoregion is a dissected plain with dense oakbrush and deciduous oak woodlands combined with ponderosa pine woodlands. The southern portion is known locally as the Black Forest. Although woodlands dominate, the region is a mosaic of woodlands and grasslands. It is somewhat more dissected than the surrounding Foothill Grasslands (26j) ecoregion. The Pine-Oak Woodlands may be an outlier of the ponderosa pine woodlands found in the mid-elevation forests of the Southern Rockies (21) to the west. Soils are formed from weathered sandstone and shale with some outwash on uplands. Land use is woodland, wildlife habitat, and some rangeland. Areas of the region are rapidly urbanizing.

26j The **Foothill Grasslands** ecoregion contains a mix of grassland types, with some small areas of isolated tallgrass prairie species that are more common much farther east. The proximity to runoff and moisture from the Front Range and the more loamy, gravelly, and deeper soils are able to support more tallgrass and midgrass species than neighboring ecoregions. Big and little bluestem, yellow Indiangrass, and switchgrass occur, along with foothill grassland communities similar to those of Ecoregion 21d. Although grasslands dominate, scattered pine woodlands similar to those found in 26i also occur. The annual precipitation of 14 to 20 inches tends to be greater than in regions farther east. Soils are loamy, gravelly, moderately deep, and formed in materials weathered from sandstone and shale, and gravelly alluvium. Rangeland and pasture are common, with small areas of cropland. Urban and suburban development has increased in recent years, expanding out from Colorado Springs and the greater Denver area.

26k The **Sand Sheets** ecoregion has rolling plains with stabilized sand sheets and areas of low sand dunes. Soils are formed from wind-deposited and alluvial sands. Natural vegetation is primarily sandsage prairie with sand reed grass, blue grama, sand dropseed, needlegrass, and sand sagebrush, and is similar to the Rolling Sand Plains (25b) ecoregion found in the neighboring High Plains (25). Annual precipitation ranges from 10 to 16 inches, less than the Foothill Grasslands to the northwest. Land use in this region is mainly rangeland.

The rolling grasslands of the Piedmont Plains and Tablelands (26e) are punctuated by the juniper dotted canyons and mesas of the Purgatoire Hills and Canyons (26g) south of La Junta. Extensive dinosaur trackways are found in some areas along the Purgatoire River.

Summary Table: Characteristics of the Ecoregions of Colorado

18. WYOMING BASIN

Level IV Ecoregions	Area (square miles)	Physiography	Elevation/Local Relief (feet)	Geology: Surficial and Bedrock	Soils: Order (Great Group)	Soils: Common Soil Series	Soils: Temperature/Moisture Regimes	Climate: Precipitation Mean annual (inches)	Climate: Frost Free Mean annual (days)	Climate: Mean Temperature January min/max; July min/max (°F)	Natural Vegetation	Land Use and Land Cover
18a. Rolling Sagebrush Steppe	2197	Rolling plains with hills, cuestas, mesas, terraces, and near the footslopes, alluvial fans, and outwash fans.	5200-7500/ 100-400	Quaternary alluvium, colluvium, outwash, thin residuum, and eolian deposits. Tertiary and Cretaceous claystone, sandstone, and other sedimentary rock. Areas of lenticular coal, oil shale, and marlstone. Rock outcrops occur.	Aridisols (Haplargids, Calciargids), Entisols (Torripsamments), Mollisols (Argiustolls), Vertisols (Haplusterts)	Ryan Park, Maybell, Rockriver, Mayspring, Ryark, Berlake, Taffim, Styers, Ruedloff, Tresano	Frigid/ Aridic, Ustic	Mostly 10-15, up to 20 at higher elevations	60-90	4/32; 48/88	Sagebrush steppe with areas of bitterbrush shrubland and scattered juniper woodland at higher elevations. Associated vegetation may include western wheatgrass, needle-and-thread, blue grama, Sandberg bluegrass, Junegrass, rabbitbrush, fringed sage, Wyoming big sagebrush, silver and black sagebrush in lowlands, and mountain big sagebrush at the higher elevations.	Shrub-covered rangeland, with some areas of cropland, especially along the Yampa River. Crops include hay, wheat, barley, and oats. Oil, gas, and coal production.
18d. Foothill Shrublands and Low Mountains	248	Footslopes, alluvial fans, hills, low mountains, ridges, and valleys.	6000-9600/ 200-1000	Quaternary alluvium and colluvium derived from Tertiary sedimentary and older crystalline rocks of the surrounding mountains. Tertiary claystone, mudstone, sandstone, and oil shale. Precambrian quartzite, conglomerate, and shale.	Alfisols (Glossocryalfs), Mollisols (Argicryolls), Inceptisols (Calcicustepts)	Uinta, Miracle, Chittom, Rentsac	Cryic/ Ustic, Xeric	10-20	60-90	8/34; 54/84	Big sagebrush shrubland, with pinyon-juniper woodland. Higher elevations may have areas of lodgepole pine, aspen, and subalpine fir. Associated vegetation may include rabbitbrush, mountain big sagebrush, pricklypear, bluebunch wheatgrass, and Idaho fescue on fine-textured soils. Rocky Mountain juniper, Utah juniper, and mountain mahogany woodlands occur on rock outcrops.	Shrub-covered rangeland and wildlife habitat.
18e. Salt Desert Shrub Basins	718	Plains, nearly level floodplains and terraces, and rolling alluvial fans. Streams are ephemeral or intermittent; many are incised and flow into playas. Substrates are fine textured material or platy shale gravels. Seasonal playas have high levels of soluble salts.	5400-7300/ 50-300	Quaternary alluvium and colluvium; gravel and fan deposits; areas of active and stabilized dune sand and loess. Tertiary and Cretaceous siltstone, sandstone, claystone, and areas of oil shale and marlstone.	Entisols (Torriorthents), Aridisols (Haplocalcids), Mollisols (Calciustolls), Inceptisols (Calciustepts)	Lahon, Browsato, Niart, Rentsac, Atchee, Mikim, Hagaston, Teaguff	Frigid, Mesic/ Ustic, Aridic	8-15	60-90	6/32; 50/88	Desert shrublands dominated by alkaline-tolerant shrubs and grasses: greasewood, Gardner's saltbush, fourwing saltbush, shadscale, bud sage, and big sagebrush. Stabilized sand dunes are dominated by alkali cordgrass, Indian ricegrass, blowout grass, alkali wildrye, and needle-and-thread.	Shrub-covered rangeland and wildlife habitat. Oil and gas production.
18f. Laramie Basin	116	High elevation valley, nearly flat floodplains, and low terraces. Streams and rivers are moderate gradient, with cobble, gravel, and sandy substrates.	7800-9100/ 100-300	Quaternary alluvium and colluvium. Tertiary gravels and fan deposits in stream and floodplain areas. Tertiary shale, siltstone, and conglomerate, Triassic and Permian siltstone, shale, and sandstone.	Mollisols (Argicryolls, Cryaquolls, Haplocryolls), Inceptisols (Eutrocrepts)	Driggs, Newfork, Pendergrass, Clergern	Cryic/ Xeric, Ustic	15-20	60-90	4/30; 40/76	Mixedgrass prairie with needle-and-thread, western wheatgrass, blue grama, Indian ricegrass, and other mixedgrass species, along with rabbitbrush, fringed sage, and various forb and shrub species.	Grassland and shrubland. Rangeland, seasonal grazing, some hay production.

20. COLORADO PLATEAUS

Level IV Ecoregions	Area (square miles)	Physiography	Elevation/Local Relief (feet)	Geology: Surficial and Bedrock	Soils: Order (Great Group)	Soils: Common Soil Series	Soils: Temperature/Moisture Regimes	Climate: Precipitation Mean annual (inches)	Climate: Frost Free Mean annual (days)	Climate: Mean Temperature January min/max; July min/max (°F)	Natural Vegetation	Land Use and Land Cover
20a. Monticello-Cortez Uplands and Sagebrush Valleys	951	Nearly level to rolling plains and basins containing stream terraces, alluvial fans, and low rolling hills and ridges.	6000-7300/ 25-200	Quaternary colluvium, alluvium, and eolian deposits. Western area underlain by Cretaceous Dakota sandstone formation. Eastern areas underlain by Cretaceous Cliff House and Pictured Cliffs sandstone and Lewis shale, or Tertiary arkosic sandstone, siltstone, and shale.	Aridisols (Calciargids, Natrargids), Alfisols (Haplustalfs), Entisols (Torriorthents), Vertisols (Haplusterts)	On uplands: Witt, Sharps, Cahona, Lazear, Pulpit. In valleys: Falfa, Arboles, Bayfield, Uzona	Mesic/ Aridic, Ustic	10-15	90-120	12/38; 52/88	Sagebrush steppe and associated grasses, with scattered pinyon-juniper woodland. Dominant species include: Wyoming big sagebrush, western wheatgrass, and Indian ricegrass. Some two-needle pinyon pine, bitterbrush, and serviceberry.	Dryland cropland with some areas of irrigated cropland, shrubland, and rangeland. Crops include pinto beans, Anasazi beans, winter wheat, and alfalfa.
20b. Shale Deserts and Sedimentary Basins	2923	Nearly level to rolling plains and basins, with benches, low rounded hills, and badlands.	4900-8000/ 25-400	Quaternary colluvium, alluvium, and eolian deposits. Cretaceous Mancos shale (northwest of Rangley, east of Meeker, Grand Valley, Dry Creek Basin, Disappointment Valley, and in the southwest, just north of the Mancos River). Tertiary claystone, siltstone, mudstone, shale and sandstone (areas west of Meeker, and in the Colorado River valley outside of Rifle). Jurassic and Triassic shale and siltstone, salt anticlines (Paradox Valley, Big Gypsum Valley).	Entisols (Torriorthents), Aridisols (Haplargids, Calciargids), Inceptisols (Calciustepts), Vertisols (Haplusterts), Mollisols (Argiustolls, Endoaquolls)	Bulkley, Evanston, Forelle, Paradox, Diamondville, Rock River, Persayo, Farb, Redlands, Hagerman, Palma, Transfer, Callan, Skein, Chipeta, Uncompahgre	Frigid, Mesic/ Aridic, Ustic	8-15	90-150	6/36; 48/92	Sparse cover of mat saltbush shrubland and salt desert scrub: shadscale, Nuttall's saltbush, blackbrush, fourwing saltbush, Wyoming big sagebrush, desert trumpet, galleta grass, and other associated grasses. Floodplain areas support greasewood, alkali sacaton, seepweed, and shadscale. Badland areas have little to no vegetation cover.	Shrubland and rangeland, areas of dryland and irrigated cropland with winter wheat, small grains, forage crops, and pinto beans. Orchards of apples, peaches, pears, and apricots in the Gunnison and Colorado River valleys. Shrublands provide important winter habitat for wildlife.
20c. Semiarid Benchlands and Canyonlands	9079	Benches, mesas, cuestas, alluvial fans, hillslopes, cliffs, arches, and canyons. A few isolated peaks. Areas of low relief alternate with areas of high relief.	5400-9200/ 100-1000	Quaternary alluvium and colluvium. Tertiary and Cretaceous siltstone, sandstone, claystone, oil shale, and marlstone. In deep canyons and cliffs: areas of Permian siltstone, sandstone, and shale, and Pre-Pennsylvanian Paleozoic shale, limestone, and sandstone.	Entisols (Torriorthents), Alfisols (Haplustalfs), Mollisols (Argiustolls, Haplustolls, Argicryolls, Haplocryolls), Aridisols (Haplargids, Calciargids, Haplocambids, Haplocalcids), Inceptisols (Calciustepts)	Atchee, Cahona, Hagerman, Lamphier, Lazear, Mikim, Palma, Persayo, Redcreek, Rentsac, Shavano, Skein, Skyway, Transfer, Utaline, Veatch, Zyme, Callan, Castner, Chipeta, Cochetopa	Mesic, Frigid; Cryic on highest elevations/ Aridic, Ustic	Mostly 10-18, on highest sites 20-25	60-120	8/40; 48/88	Pinyon-juniper woodland, Gambel oak woodland, and sagebrush steppe with black sagebrush, winterfat, Mormon tea, fourwing saltbush, shadscale, galleta grass, and blue grama.	Woodland and shrubland. Rangeland, recreation, coal mining, oil and gas production. Oil shale extraction.
20d. Arid Canyonlands	70	Narrow canyons, cliffs, valley floors, floodplains, structural benches, mesas, and cuestas. Terrain deeply eroded by major rivers and their tributaries.	4900-6000/ 200-500	Quaternary alluvium and colluvium. Cretaceous sandstone, shale, and conglomerate. Rock outcrops are common.	Entisols (Torriorthents), Aridisols (Natrargids)	Clayprings, Myton, Uzona, Tocito	Mesic/ Aridic	8-10	120-150	18/40; 60/92	Desert shrubland: blackbrush, shadscale, Indian ricegrass, fourwing saltbush, blue grama, mat saltbush, saline wildrye, and galleta grass.	Shrubland. Recreation, rangeland, and wildlife habitat.
20e. Escarpments	1013	High, dissected cliffs, escarpments, mesa tops, and breaks with a wide elevational range. Includes the Book Cliffs and Roan Cliffs.	6000-9000/ 500-3000	Quaternary alluvium and colluvium. Tertiary and Cretaceous sandstone, shale, siltstone, marlstone, limestone, and areas of oil shale. Rock outcrops are common.	Entisols (Torriorthents), Aridisols (Natrargids)	Clayprings, Myton, Uzona	Mesic/ Aridic	Mostly 15-25, up to 32 at higher elevations	60-90	4/36; 46/84	Pinyon-juniper woodland, mountain mahogany, aspen, and Douglas-fir forest at highest elevations.	Shrubland, evergreen and deciduous woodland, some forests. Recreation and wildlife habitat, some limited grazing.
20f. Uinta Basin Floor	39	Synclinal basin containing mountain-fed streams, alluvial terraces, outwash terraces, floodplains, hills, and ridges.	5500-6100/ 50-200	Quaternary colluvium, alluvium, and eolian deposits. Tertiary and Cretaceous sandstone and shale.	Mollisols (Haplustolls), Entisols (Torriorthents), Aridisols (Haplargids, Haplocalcids)	Pens, Walknolls, Veatch, Redcreek, Castner	Mesic/ Aridic	8-10	90-120	6/34; 56/88	Desert shrubland: saltbush, greasewood, shadscale, Indian ricegrass, galleta grass, Wyoming big sagebrush, fourwing saltbush, winterfat, needle-and-thread.	Shrubland. Rangeland, cropland, and wildlife habitat. Oil and gas production.

21. SOUTHERN ROCKIES

Level IV Ecoregions	Area (square miles)	Physiography	Elevation/Local Relief (feet)	Geology: Surficial and Bedrock	Soils: Order (Great Group)	Soils: Common Soil Series	Soils: Temperature/Moisture Regimes	Climate: Precipitation Mean annual (inches)	Climate: Frost Free Mean annual (days)	Climate: Mean Temperature January min/max; July min/max (°F)	Natural Vegetation	Land Use and Land Cover
21a. Alpine Zone	3690	Glaciated. High mountains with steep slopes, ridges, and exposed rocky peaks above timberline. Some wetlands and glacial lakes. High gradient headwater streams with boulder, cobble, and bedrock substrates.	10000-14400+/ 400-2500+	Quaternary rubble, glacial drift, and colluvium. Exposed bedrock. Tertiary andesitic lavas, basalts, breccia, tuffs, and conglomerates. Precambrian metasedimentary rocks: pelitic schist, amphibole schist, quartzite, diamictite, quartz-pebble conglomerate, and marble. Permian and Pre-Pennsylvanian Sangre de Cristo Formation: arkosic conglomerate, sandstone, and siltstone.	Inceptisols (Dystrocryepts)	Mirror, Bross, Whitecross, Henson, Tecwinot	Cryic/ Udic	35-70+ Deep winter snowpack	Less than 30	-8/24; 36/72	Alpine meadows. Dominated by bistort, alpine timothy, alpine avens, alpine bluegrass, alpine clover, tufted hairgrass, and various sedges. Trees if present are krummholz (dwarf and/or prostrate shrubs) and include spruce, fir, and pine. Willow thickets occur in depressions and wet meadows.	Snow, ice, bare rock, alpine meadows. Recreation and wildlife habitat. Snowmelt provides water source to lower-elevation ecoregions.
21b. Crystalline Subalpine Forests	4737	Glaciated. High mountains with steep slopes. High gradient perennial streams with boulder, cobble, and bedrock substrates.	8500-10000 in the north, 9000-12000 in the south/ 400-2500	Quaternary glacial till and colluvium. Tertiary intrusive rocks. Precambrian metasedimentary, metavolcanic, and intrusive rocks: pelitic schist, amphibole schist, quartzite, quartz-pebble conglomerate, and marble. Precambrian granitic gneiss, felsic gneiss, amphibolite, and granitic rocks. Copper, silver, and gold deposits.	Alfisols (Glossocryalfs, Haplocryalfs), Mollisols (Argiustolls, Argicryolls, Haplustolls)	Boyle, Granile, Kebler, Lakehelen, Leadville, Limber, Lucky, Peeler, Resort, Seitz	Cryic, Frigid/ Udic, Ustic	30-58 Deep winter snowpack	30-60	-4/28; 36/72	Subalpine forests dominated by Engelmann spruce and subalpine fir. Often interspersed with aspen groves, lodgepole pine forest, or mountain meadows, and with Douglas-fir at lower elevations. May include limber pine and Rocky Mountain bristlecone pine. Understory is dominated by dwarf huckleberry and grouse whortleberry.	Evergreen and some deciduous forest. Timber production, recreation, hunting, wildlife habitat, and seasonal grazing. Some gold mining. Snow cover is a major source of water for lower, more arid ecoregions.
21c. Crystalline Mid-Elevation Forests	4455	Partially glaciated. Low mountain ridges, slopes, and outwash fans. Moderate to high gradient perennial streams with boulder, cobble, and bedrock substrates.	7000-9000/ 400-1000	Quaternary glacial till, colluvium, and alluvium. Precambrian metasedimentary, metavolcanic, and intrusive rocks: pelitic schist, amphibole schist, quartzite, diamictite, quartz-pebble conglomerate and marble. Precambrian granitic gneiss, felsic gneiss, amphibolite, and granitic rocks. Copper, silver, and gold deposits.	Alfisols (Haplustalfs, Glossocryalfs), Entisols (Cryorthents, Ustorthents), Inceptisols (Dystrocryepts), Mollisols (Argicryolls, Haplocryolls)	Boyett, Granile, Larkson, Peeler, Seitz, Wetmore, Legault, Sphinx, Catamount, Ivywild, Cabin, Frenchcreek, Pendant, Pierian, Raleigh, Rogert, Teocalli, Woodhall	Cryic, Frigid/ Udic, Ustic	20-32	60-90	8/36; 50/80	Ponderosa pine forest with areas of Douglas-fir forest. Understory may include mountain mahogany, bitterbrush, wax currant, skunkbush, woods rose, mountain muhly, Junegrass, Arizona fescue, king spike-fescue, and various sedges.	Evergreen and some deciduous forest. Wildlife habitat, rangeland, timber production, recreation, and mineral extraction. Some gold mining.
21d. Foothill Shrublands	4780	Unglaciated. Hills, ridges, and footslopes. Moderate to high gradient perennial, intermittent, and ephemeral streams with cobble, gravel, and sandy substrates.	Mostly 6000-8500, small areas up to 10000/ 200-900	Quaternary glacial till, colluvium, and alluvium. Tertiary and Cretaceous shale and sandstone. Permian sandstone, limestone, and siltstone. Precambrian metasedimentary: sandstone, claystone, shale, siltstone, and conglomerate. Precambrian metamorphic rocks: amphibolite, schist, gneiss, quartzite, quartz-pebble conglomerate, and marble.	Alfisols (Haplustalfs), Aridisols (Haplargids, Haplocalcids), Entisols (Torriorthents, Ustorthents), Mollisols (Argicryolls, Argiustolls, Haplustolls, Calciustolls)	Ring, Bond, Bronell, Brownsto, Coaldale, Potts, Kerhayden, Neville, Patent, Travessilla, Bowen, Bushvalley, Castner, Dominson, Embargo, Gelkie, Kueldar, Libeg, Lucky, Martinsdale, Nederland, Noden, Norrizon, Pando, Parlin, San Isabel, St. Elmo	Mesic, Frigid, Cryic/ Ustic, Aridic	12-20	75-100	10/36; 46/84	Sagebrush shrubland, pinyon-juniper woodland, and foothill-mountain grasslands. Also includes areas of mountain mahogany shrublands and scattered Gambel oak woodlands. The woodlands are often interspersed with mountain big sagebrush, skunkbush, serviceberry, fringed sage, rabbitbrush, blue grama, Junegrass, western wheatgrass, Indian ricegrass, Scribner needlegrass, muttongrass, and blue grama.	Shrubland and grassland, some woodland. Rangeland and wildlife habitat.
21e. Sedimentary Subalpine Forests	6196	Glaciated. High mountains with steep slopes. High gradient perennial streams with boulder, cobble, and bedrock substrates.	8500-10000 in the north, 9000-12000 in the south/ 400-1500	Quaternary drift and colluvium. Faulted and folded Tertiary sedimentary rocks of limestone, siltstone, shale, and sandstone. Permian arkosic conglomerate, sandstone, and siltstone of the Sangre de Cristo Formation. Flat Top Mountains: Pre-Pennsylvanian Paleozoic limestone, sandstone, quartzite, and dolomite. Uncompahgre Plateau: Cretaceous sandstone and shale.	Alfisols (Haplocryalfs, Glossocryalfs), Entisols (Cryorthents), Inceptisols (Eutrocrepts), Mollisols (Haplocryolls, Argicryolls)	East: Ashcroft, Granile, Leadville, Limber, Seitz, Vulcan, Wetterhorn, Gralic, Storm, Adel, Leaps, Ruby, Southwest: Graysill, Scotch, Needleton, Ryman. Uncompahgre Plateau: Gateway	Cryic/ Udic, Ustic	28-50 Deep winter snowpack	30-60	2/32; 40/76	Subalpine forests dominated by subalpine fir, Engelmann spruce, and lodgepole pine. Areas of Douglas-fir or aspen forests at lower elevations. Understory may include whortleberry, kinnickinnick, snowberry, sedges, mountain brome, and forbs.	Evergreen and some deciduous forest. Timber production, recreation, hunting, wildlife habitat, and seasonal grazing. Some gold mining. Snow cover is a major source of water for lower, more arid ecoregions.
21f. Sedimentary Mid-Elevation Forests	7532	Partially glaciated. Low mountain ridges, slopes, and outwash fans. Moderate to high gradient perennial streams with boulder, cobble, and bedrock substrates.	7000-9000/ 400-1000	Quaternary drift and colluvium. Faulted and folded Tertiary sedimentary rocks of limestone, siltstone, shale, and sandstone. Uncompahgre Plateau: Cretaceous sandstone and shale.	Alfisols (Haplustalfs, Glossocryalfs, Haplocryalfs), Entisols (Ustorthents), Mollisols (Argicryolls, Haplustolls, Argiustolls, Haplocryolls), Inceptisols (Haplustepts)	East: Allens Park, Granile, Gulnare, Lakehelen, McIntyre, Mulgon, Seitz, Troutville, Ula, Wahatoya, Brownsto, Patent, Cabin, Castner, Pierian, Poncha. Southwest: Archuleta, Fivepine, Nortez, Morapos, Cerro, Fughes, Nortez. Uncompahgre Plateau: Mayflower, Cebone, Wetopa, Lamphier, Falcon	Frigid, Cryic/ Udic, Ustic	20-32	60-90	6/34; 44/84	Ponderosa pine forest, Gambel oak woodland, and aspen forest (especially on the Western slope). Areas of mountain mahogany and two-needle pinyon pine. Shrub vegetation includes antelope bitterbrush, fringed sage, serviceberry, and snowberry. Understory grasses of Arizona fescue, bluegrass, Junegrass, needlegrasses, mountain muhly, pine dropseed, and mountain brome.	Evergreen and some deciduous forest. Timber production, summer livestock grazing, wildlife habitat, and recreation. Some copper, silver, and gold mining.
21g. Volcanic Subalpine Forests	3940	Glaciated. High mountains with steep slopes. High gradient perennial streams with boulder, cobble, and bedrock substrates.	9000-12000/ 600-1800	Quaternary drift and colluvium. Tertiary pyroclastic material, breccia, and volcanic ash flows, including basalt, andesitic lavas, and water-laid volcanics and conglomerates.	Alfisols (Haplocryalfs, Glossocryalfs), Inceptisols (Eutrocrepts), Mollisols (Argicryolls, Haplocryolls)	Frisco, Granile, Needleton, Seitz, Snowdon, Taglake, Clayburn, Hapgood, Lamphier, Wetopa, Rubble and rock outcrops	Cryic/ Udic, Ustic	28-50 Deep winter snowpack	30-60	2/32; 40/74	Subalpine forests dominated by Engelmann spruce, subalpine fir, aspen and, in the north, lodgepole pine. Understory may include whortleberry, kinnickinnick, snowberry, sedges, mountain brome, and forbs.	Evergreen and some deciduous forest. Timber production, recreation, hunting, wildlife habitat, and seasonal grazing. Some gold mining. Snow cover is a major source of water for lower, more arid ecoregions.
21h. Volcanic Mid-Elevation Forests	1010	Partially glaciated. Low mountain ridges, slopes, and outwash fans. Moderate to high gradient perennial streams with boulder, cobble, and bedrock substrates.	7000-9000/ 400-1000	Quaternary drift and colluvium. Tertiary pyroclastic material, breccia, and volcanic ash flows, including basalt, andesitic lavas, and water-laid volcanics and conglomerates.	Alfisols (Haplocryalfs, Glossocryalfs), Mollisols (Argicryolls, Endoaquolls)	Frisco, Granile, Seitz, Shule, Cochetopa, Youman	Cryic/ Ustic	20-32	60-90	4/32; 42/76	Ponderosa pine, Douglas-fir, and aspen forests, with scattered areas of Gambel oak woodlands. Understory of dwarf juniper, western wheatgrass, Oregon grape, blue grama, sideoats grama, and needlegrasses.	Evergreen and some deciduous forest. Timber production, summer livestock grazing, wildlife habitat, and recreation. Some gold mining.
21i. Sagebrush Parks	2098	High intermontane valleys. Moderate gradient perennial streams with cobble, gravel, and sandy substrates.	7500-9500/ 100-400	Quaternary alluvium, colluvium, and loess. Cretaceous and Tertiary sandstone, shale, siltstone, and conglomerate. Tertiary volcanic rocks.	Mollisols (Argiustolls, Endoaquolls, Argicryolls, Haplocryolls)	Evanston, Gold Creek, Lucky, Parlin, Cheadle, Gas Creek	Cryic, Frigid/ Ustic, Aridic	10-16	60-90	-4/28; 44/78	Sagebrush shrubland: Wyoming big sagebrush, mountain big sagebrush, black sagebrush, western wheatgrass, bottlebrush squirreltail, and elk sedge. Areas of bunchgrasses include Arizona fescue and mountain muhly.	Shrubland and some grassland. Recreation, rangeland, and wildlife habitat. Some hay production. Oil and gas production in North Park.
21j. Grassland Parks	1254	High intermontane valleys. Moderate gradient perennial streams with cobble, gravel, and sandy substrates. Some wetlands.	7900-9800/ 100-400	Quaternary alluvium, colluvium, and sand. Tertiary siltstone, sandstone, conglomerate, volcanic basalt and ash-flow tuff. Precambrian gneiss, schist, and quartzite.	Mollisols (Haplocryolls, Argicryolls, Argiustolls, Endoaquolls, Cryaquolls)	Gebson, Alvarado, Becks, Bushvalley, Coutis, Feltonia, Gas Creek, Gelkie, Hodden, Venable, Quander, Norriston, Morset, Libeg, Hoodle	Cryic, Frigid/ Ustic, some Aquic	10-20	60-90	6/36; 40/76	Foothill grasslands with bunchgrasses dominant: Arizona fescue, Idaho fescue, Columbia needlegrass, Canby bluegrass, mountain muhly, bluebunch wheatgrass, needle-and-thread, Junegrass, and slender wheatgrass.	Grassland. Recreation, rangeland, and wildlife habitat.

22. ARIZONA/NEW MEXICO PLATEAU

Level IV Ecoregions	Area (square miles)	Physiography	Elevation/Local Relief (feet)	Geology: Surficial and Bedrock	Soils: Order (Great Group)	Soils: Common Soil Series	Soils: Temperature/Moisture Regimes	Climate: Precipitation Mean annual (inches)	Climate: Frost Free Mean annual (days)	Climate: Mean Temperature January min/max; July min/max (°F)	Natural Vegetation	Land Use and Land Cover
22a. San Luis Shrublands and Hills	993	Low mountains, hills, mesas, and foothills.	7900-9100/ 400-1000	Quaternary gravels and alluvium. Tertiary igneous rocks of basalt flows, pre-ash flow andesitic lavas, breccias, tuffs, and conglomerates.	Aridisols (Haplocalcids, Calciargids), Mollisols (Argiustolls)	Travelers, Garita, Luhon, Space City, Costilla, Tolman, Bendire, Carecanti, Rock River, Stunner, Hesperus	Frigid/ Aridic, Ustic	10-14	30-60	4/32; 42/76	Shrublands, grasslands, and pinyon-juniper woodlands at highest elevations. Species include big sagebrush, rubber rabbitbrush, winterfat, western wheatgrass, green needlegrass, blue grama, and needle-and-thread.	Shrub- and grass-covered rangeland. Low density grazing, wildlife habitat.
22b. San Luis Alluvial Flats and Wetlands	1217	Irregular plains. Wetlands, springs, and areas with a high water table. Few large perennial streams which originate in mountains.	7500-8000/ 10-100	Quaternary alluvium of gravel, sand, and silt.	Mollisols (Argiaquolls, Endoaquolls, Calciustolls), Aridisols (Haplargids, Natrargids), Entisols (Torriorthents, Psammaquents)	Graypoint, Platoro, Dunul, San Arcacio, Zinzer, Acacio, Alamosa, Lajara, Vastine, Gunbarrel, Mosca, San Luis	Frigid/ Aridic, Aquic, Ustic	6-10	60-90	0/34; 46/80	Shrublands dominated by shadscale, fourwing saltbush, and greasewood.	Irrigated cropland has replaced most of the natural vegetation. Crops include potatoes, alfalfa, barley, hay, and wheat. Small areas of vegetables such as lettuce, spinach, and carrots.
22c. Salt Flats	866	Irregular plains and alkaline basins.	7400-7700/ 10-100	Quaternary alluvium of gravel, sand, and silt.	Entisols (Torripsamments), Aridisols (Natrargids)	Space City, Costilla, Cotopaxi, Hooper, San Luis, Corlett	Frigid/ Aridic	6-8	60-90	0/34; 46/80	Shrublands dominated by shadscale, fourwing saltbush, greasewood, horsebrush, spiny hopsage, rubber rabbitbrush, saltgrass, and alkali sacaton.	Shrub-covered rangeland with low density grazing, wildlife habitat, and some small areas of irrigated cropland.
22e. Sand Dunes and Sand Sheets	254	Large dunes, low parabolic and longitudinal shrub-stabilized dunes, and sand sheets.	7500-8900/ 100-700	Quaternary eolian sand deposits, dunes, and sand sheets.	Entisols (Torripsamments), Mollisols (Endoaquolls, Argiaquolls), Aridisols (Haplocalcids)	Cotopaxi, Space City, Costilla, Alamosa, Lajara, Vastine	Frigid/ Aridic	8-12	60-90	0/34; 44/80	Sand sagebrush, rubber rabbitbrush, sand dropseed, sand verbena, prairie sunflower, and spiny hopsage on sand sheets. Dune areas are mostly devoid of vegetation, some Indian ricegrass, blowout grass, and lemon scurfpea.	Bare sand, shrublands, grasslands. Recreation, some low density rangeland on vegetatively stabilized sand sheets. Wildlife habitat.

25. HIGH PLAINS

Level IV Ecoregions	Area (square miles)	Physiography	Elevation/Local Relief (feet)	Geology: Surficial and Bedrock	Soils: Order (Great Group)	Soils: Common Soil Series	Soils: Temperature/Moisture Regimes	Climate: Precipitation Mean annual (inches)	Climate: Frost Free Mean annual (days)	Climate: Mean Temperature January min/max; July min/max (°F)	Natural Vegetation	Land Use and Land Cover
25b. Rolling Sand Plains	4620	Undulating plains with areas of active sand dunes. Few perennial streams. Drainage network is not well established due to a lack of runoff and sand-choked drainage ways. Disappearing subterranean streams.	3500-5100/ 25-150	Quaternary eolian sand sheets and dunes. Underlain by Tertiary claystones and sandstones of the Ogallala Formation.	Entisols (Torripsamments), Alfisols (Haplustalfs), Mollisols (Argiustolls, Haplustolls), Aridisols (Haplargids)	Valent, Vona, Julesburg, Haxtun, Jayem, Bushet, Bijou	Mesic/ Aridic, Ustic	12-20	140-160	14/42; 60/92	Sandsage prairie: sand sagebrush, sand bluestem, prairie sandreed, blowout grass, lemon scurfpea, little bluestem, rabbitbrush, Indian ricegrass, and sand dropseed.	Grassland and rangeland with some areas of irrigated cropland.
25c. Moderate Relief Plains	6206	Irregular plains with moderate slope. Intermittent streams, with a few large perennial streams which mostly originate in higher relief areas. Silty and sandy substrates. Small, open, depressional wetland "playas" scattered throughout region.	3600-6500/ 50-200	Quaternary loess, sandy, gravelly, and loamy alluvium, and some thin residuum. Tertiary claystone, sandstone, and conglomerate, including the Tertiary Ogallala Formation in the east. Cretaceous shales, sandstones, claystones, and coal beds in the west.	Mollisols (Argiustolls, Paleustolls, Haplustolls), Alfisols (Haplustalfs), Aridisols (Haplargids), Entisols (Torriorthents)	Olney, Ascalon, Platner, Stoneham, Nucla, Kim, Dix, Altvan, Keith, Kuma, Ulysses, Colby, Norka	Mesic/ Ustic, Aridic	12-18	140-160	14/44; 60/92	Shortgrass prairie: blue grama, buffalograss, with threadleaf sedge, fringed sage, Junegrass, and western wheatgrass. Riparian areas contain cottonwood/shrub/herbaceous species.	Grassland and rangeland with areas of dryland and irrigated agriculture. Gas and oil production.
25d. Flat to Rolling Plains	13219	Flat to rolling plains. Intermittent streams, with a few large perennial streams. Silty and sandy substrates. Small, open, depressional wetland "playas" scattered throughout region.	3600-5700/ 10-150	Quaternary loess, alluvial deposits, and some thin residuum. Tertiary gravel, claystone, sandstone, and sand deposits, including the Ogallala Formation in the east. Cretaceous shales, sandstones, claystones, and coal beds in the west.	Mollisols (Argiustolls, Paleustolls, Haplustolls), Alfisols (Haplustalfs), Entisols (Ustorthents, Torriorthents)	Stoneham, Fort Collins, Olney, Richfield, Keith, Colby, Wages, Rosebud, Manter, Ascalon, Platner, Haxtun, Rago, Alliance, Canyon, Weld, Norka, Adena	Mesic/ Ustic, Aridic	12-18	140-180	16/46; 62/94	Shortgrass prairie: blue grama, buffalograss, with threadleaf sedge, fringed sage, Junegrass, and western wheatgrass. Riparian areas contain cottonwood/shrub/herbaceous species.	Dryland and irrigated cropland with winter wheat, grain sorghum, corn, barley, sunflowers, and sugar beets (grown under irrigation). Some grassland and rangeland. Gas and oil production, especially in the Denver Basin.
25l. Front Range Fans	782	Fans, irregular plains, and scattered low hills. Intermittent and perennial streams with gravelly, silty, and sandy substrates. Streams are generally colder and may contain species found more commonly in the Southern Rockies (21).	4800-5300/ 50-200	Quaternary gravel and sandy alluvium, eolian sand deposits. Underlain by sandstone, claystone, and shale of the Cretaceous Laramie and Fox Hills formations and sandstone, mudstone, claystone, and conglomerate of the Tertiary Denver and Arapahoe formations to the south.	Mollisols (Argiustolls), Aridisols (Haplargids), Alfisols (Haplustalfs), Entisols (Torriorthents)	Altvan, Ascalon, Larimer, Stoneham, Dacono, Nunn, Renohill, Shingle, Otero, Thedalund, Olney, Ulm, Englewood, Nederland, Kutch, Denver	Mesic/ Ustic, Aridic	14-18	120-140	12/40; 56/88	Shortgrass and mixedgrass prairie: blue grama, needle-and-thread, western wheatgrass, buffalograss, Junegrass, and little bluestem. Big bluestem is scattered in low concentrations throughout the region. Riparian areas contain cottonwood/shrub/herbaceous species.	Urban and residential, some irrigated cropland with hay, corn, wheat, and barley. Many manmade lakes and gravel pits.

26. SOUTHWESTERN TABLELANDS

Level IV Ecoregions	Area (square miles)	Physiography	Elevation/Local Relief (feet)	Geology: Surficial and Bedrock	Soils: Order (Great Group)	Soils: Common Soil Series	Soils: Temperature/Moisture Regimes	Climate: Precipitation Mean annual (inches)	Climate: Frost Free Mean annual (days)	Climate: Mean Temperature January min/max; July min/max (°F)	Natural Vegetation	Land Use and Land Cover
26e. Piedmont Plains and Tablelands	13373	Irregular and dissected plains. Intermittent streams, with a few large perennial streams which mostly originate in mountains or higher relief areas. Silty and sandy substrates.	3600-6500/ 50-200	Quaternary alluvium and eolian deposits of loess, silt, and sand. Cretaceous shale, limestone, and sandstone.	Alfisols (Haplustalfs), Mollisols (Argiustolls, Paleustolls), Entisols (Torriorthents), Aridisols (Haplargids, Natrargids, Haplocalcids)	Wiley, Baca, Colby, Manvel, Minnequa, Penrose, Rocky Ford, Nepesta, Ascalon, Fort Collins, Stoneham, Kim, Razor, Midway, Limon, Deertrail, Absted, Harvey, Truckton, Yoder, Blakeland, Ordway, Cadoma, Campo, Platner	Mesic/ Ustic, Aridic	Mostly 12-16, with 10-12 in low-lying area between Pueblo and Las Animas	120-160	14/46; 60/92	Shortgrass prairie: blue grama, green needlegrass, buffalograss, needle-and-thread, and red threeawn. Also may include mixed grass species such as western wheatgrass, galleta grass, sand dropseed, and little bluestem. Sand sagebrush, yucca and cholla cactus can also occur.	Mostly grass-covered rangeland with scattered areas of dry and irrigated cropland. Dryland agriculture is mostly to the north of the Arkansas River.
26f. Mesa de Maya/ Black Mesa	565	Broad mesa, knobs, and dissected plains with deep canyons. Rough, rocky, steep slopes are common.	4500-6200/ 75-500	Quaternary alluvium and colluvium. Capping the mesa: Tertiary basalt, 60 to 70 feet thick. Cretaceous sandstone and shale. On slopes and exposed canyons: Jurassic sandstone, claystone, mudstone, and limestone. Triassic sandstone, siltstone, and limestone.	Mollisols (Argiustolls, Haplustolls), Entisols (Torriorthents), Aridisols (Haplocambids)	Capulin, Torreon, Apache, Travessilla, Carnero, Fruitland, Manzano, Alicia, Kim, Rock outcrops	Mesic/ Ustic, Aridic	14-18	100-150	16/46; 58/90	Pinyon-juniper woodland and shortgrass prairie. On top of the mesa: shortgrass prairie dominated by blue grama, hairy grama, sideoats grama, galleta grass, buffalograss, and western wheatgrass. On rocky slopes and in canyons: juniper with pinyon pine-oak woodlands with a few isolated areas of mesquite shrublands.	Woodland, rangeland, grassland, and wildlife habitat.
26g. Purgatoire Hills and Canyons	1041	Dissected plains and tablelands with some hills, steep canyons, and rock outcrops.	4900-7400/ 100-700	Quaternary alluvium and colluvium. Cretaceous sandstone and shale. Jurassic sandstone, claystone, and shale. Triassic sandstone and siltstone. Permian siltstone, dolomite, and sandstone.	Entisols (Torriorthents), Alfisols (Haplustalfs)	Travessilla, Baca, Manvel, Minnequa, Penrose	Mesic/ Ustic, Aridic	12-16	100-150	14/46; 58/90	Juniper woodlands and shortgrass prairie. Rocky Mountain juniper, oneseed juniper, Utah juniper, blue grama, and buffalograss.	Woodland and wildlife habitat.
26h. Pinyon-Juniper Woodlands and Savannas	997	Dissected plains and tablelands with some scattered ridges and hills.	5100-7100/ 100-500	Quaternary alluvium and colluvium. Cretaceous shale, limestone, and sandstone.	Entisols (Torriorthents), Alfisols (Haplustalfs), Mollisols (Argiustolls), Aridisols (Haplargids)	Travessilla, Baca, Noden, Bond, Razor, Midway, Limon, Manvel, Minnequa, Penrose, Wetmore (in west at the base of mountains). Rock outcrops.	Mesic, Frigid/ Ustic, Aridic	12-20, with highest near the mountains	90-120	16/44; 56/88	Pinyon-juniper woodlands: pinyon pine, Rocky Mountain juniper, eastern redcedar, and oneseed juniper.	Woodland and wildlife habitat.
26i. Pine-Oak Woodlands	580	Dissected plains and hills.	6000-7500/ 100-300	Quaternary alluvium and colluvium. Tertiary and Cretaceous arkosic conglomerate, sandstone, claystone, and shale.	Mollisols (Argiustolls, Paleustolls), Alfisols (Haplustalfs)	Brussett, Peyton, Kettle, Weld, Fondis, Bresser	Frigid, Mesic/ Ustic	14-20	90-120	10/36; 50/80	Pine-oak woodlands and foothill grasslands. Ponderosa pine, Gambel oak, mountain mahogany, skunkbush, western serviceberry, and chokecherry. Gambel oak often forms a well developed understory in the Ponderosa pine forests. Grasslands include yellow Indiangrass, little bluestem, switchgrass, fescues, mountain muhly, Junegrass, bluebunch wheatgrass, needle-and-thread, slender wheatgrass, western wheatgrass, sideoats grama, and galleta grass.	Woodland, grassland, rangeland, and wildlife habitat. Increasing urban and residential development.
26j. Foothill Grasslands	1805	Dissected and irregular plains.	5900-7000/ 50-200	Quaternary alluvium. Tertiary and Cretaceous arkosic conglomerate, sandstone, claystone, and shale.	Mollisols (Argiustolls, Haplustolls), Entisols (Torrifluvents), Aridisols (Haplargids)	Bresser, Truckton, Ellicott, Stapleton, Columbine, Cushman, Ascalon	Mesic/ Aridic, Ustic	14-20	100-150	12/40; 52/84	Foothills prairie with a scattering of pine woodlands. Yellow Indiangrass, big and little bluestem, switchgrass, fescues, mountain muhly, Junegrass, bluebunch wheatgrass, needle-and-thread, slender wheatgrass, western wheatgrass, sideoats grama, and galleta grass. Ponderosa pine, mountain mahogany, Gambel oak, western serviceberry, and chokecherry in small scattered pockets.	Grassland, rangeland, some scattered woodland and cropland. Increasing urban and residential development.
26k. Sand Sheets	566	Rolling plains with stabilized sand sheets and areas of low sand dunes.	3500-5900/ 25-100	Quaternary eolian sands and alluvial gravels and sands. Cretaceous shale and sandstone.	Entisols (Torripsamments), Aridisols (Haplargids), Alfisols (Haplustalfs)	Valent, Vona, Bijou, Wigton	Mesic/ Aridic, Ustic	10-16	120-150	14/46; 60/88	Sandsage prairie: sand sagebrush, sand bluestem, prairie sandreed, blowout grass, lemon scurfpea, and little bluestem.	Grassland, some shrubland, and rangeland.

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