Appendix B
Characteristics of Level IV Ecoregions in Colorado

The exhibit below is based on material contained in the poster entitled, *Ecoregions of Colorado*, as available from the U.S. Environmental Protection Agency's (EPA's) Western Ecology Division (http://www.epa.gov/wed/pages/ecoregions/co_eco.htm#Ecoregions%20denote).

The poster is part of a collaborative project primarily between EPA Region 8, EPA 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).

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, S.A., Omernik, J.M., and Larsen, D.P., 1999, Ecoregions – a geographic framework to guide risk characterization and ecosystem management: Environmental Practice, v. 1, no. 3, p. 141-155). 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 geographic areas (Omernik, J.M., Chapman, S.S., Lillie, R.A., and Dumke, R.T., 2000, Ecoregions of Wisconsin: Transactions of the Wisconsin Academy of Sciences, Arts, and Letters, v. 88, p. 77-103).

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, E., 1986, Terrestrial ecozones of Canada: Ottawa, Environment Canada, Ecological Land Classification Series no. 19, 26 p.; Omernik, J.M., 1987, Ecoregions of the conterminous United States (map supplement): Annals of the Association of American Geographers, v. 77, no. 1, p. 118-125, scale 1:7,500,000; Omernik, J.M., 1995, Ecoregions – a framework for environmental management, in Davis, W.S., and Simon, T.P., eds., Biological assessment and criteria-tools for water resource planning and decision making: Boca Raton, Florida, Lewis Publishers, p. 49-62). These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
18. Wyoming Basin (Level III Ecoregion)								
Rolling Sagebrush Steppe (18a)	2,197	Rolling plains with hills, cuestas, mesas, terraces, and near the footslopes, alluvial fans, and outwash fans.	5,200-7,500/ 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.	Ryan Park, Maybell, Rockriver, Mayspring, Ryark, Berlake, Taffim, Styers, Ruedloff, Tresano	*Precipitation (annual)*: 10-15 inches, up to 20 at higher elevations *January min/max (°F)*: 4/32 *July min/max (°F)*: 48/88 *Frost free days*: 60-90	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.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
Foothill Shrublands and Low Mountains (18d)	248	Footslopes, alluvial fans, hills, low mountains, ridges, and valleys.	6,000-9,600/ 200-1,000	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.	Uinta, Miracle, Chittum, Rentsac	*Precipitation (annual)*: 10-20 inches *January min/max (°F)*: 8/34 *July min/max (°F)*: 54/84 *Frost free days*: 60-90	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.
Salt Desert Shrub Basins (18e)	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.	5,400-7,300/ 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.	Luhon, Brownsto, Niart, Rentsac, Atchee, Mikim, Huguston, Teagulf	*Precipitation (annual)*: 8-15 inches *January min/max (°F)*: 6/32 *July min/max (°F)*: 50/88 *Frost free days*: 60-90	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.
Laramie Basin (18f)	116	High elevation valley, nearly flat floodplains, and low terraces. Streams and rivers are moderate gradient, with cobble, gravel, and sandy substrates.	7,800-9,100/ 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.	Driggs, Newfork, Pendergrass, Clergern	*Precipitation (annual)*: 15-20 inches *January min/max (°F)*: 4/30 *July min/max (°F)*: 40/76 *Frost free days*: 60-90	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.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
20. Colorado Plateaus (Level III Ecoregion)								
Monticello-Cortez Uplands and Sagebrush Valleys (20a)	951	Nearly level to rolling plains and basins containing stream terraces, alluvial fans, and low rolling hills and ridges.	6,000-7,300/ 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.	On uplands: Witt, Sharps, Cahona, Lazear, Pulpit. In valleys: Falfa, Arboles, Bayfield, Uzona	*Precipitation (annual)*: 10-15 inches *January min/max (°F)*: 12/38 *July min/max (°F)*: 52/88 *Frost free days*: 90-120	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.
Shale Deserts and Sedimentary Basins (20b)	2,923	Nearly level to rolling plains and basins, with benches, low rounded hills, and badlands.	4,900-8,000/ 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 Gypsym Valley).	Bulkley, Evanston, Forelle, Paradox, Diamondville, Rock River, Persayo, Farb, Redlands, Hagerman, Palma, Transfer, Callan, Skein, Chipeta, Uncompahgre	*Precipitation (annual)*: 8-15 inches *January min/max (°F)*: 6/36 *July min/max (°F)*: 48/92 *Frost free days*: 90-150	Sparse cover of mat saltbrush shrubland and salt desert scrub; shadscale, Nuttall's saltbrush, blackbrush, fourwing saltbrush, 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.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
Semiarid Benchlands and Canyonlands (20c)	9,079	Benches, mesas, cuestas, alluvial fans, hillslopes, cliffs, arches, and canyons. A few insolated peaks. Areas of low relief alternate with areas of high relief.	5,400-9,200/ 100-1,000	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.	Atchee, Cahona, Hagerman, Lamphier, Lazear, Mikim, Palma, Persayo, Redcreek, Rentsac, Shavano, Skein, Skyway, Transfer, Utaline, Veatch, Zyme, Callan, Castner, Chipeta, Cochetopa	*Precipitation (annual)*: 10-18 inches (on highest sites) 20-25 inches *January min/max (°F)*: 8/40 *July min/max (°F)*: 48/88 *Frost free days*: 60-120	Pinyon-juniper woodland, Gambel oak woodland, and sagebrush steppe with black sagebrush, winterfat, Mormon tea, fourwing saltbrush, shadscale, galleta grass, and blue grama.	Woodland and shrubland. Rangeland, recreation, coal mining, oil and gas production. Oil shale extraction.
Arid Canyonlands (20d)	70	Narrow canyons, cliffs, valley floors, floodplains, structural benches, mesas, and cuestas. Terrain deeply eroded by major rivers and their tributaries.	4,900-6,000/ 200-500	Quaternary alluvium and colluvium. Cretaceous sandstone, shale, and conglomerate. Rock outcrops are common.	Claysprings, Myton, Uzona, Tocito	*Precipitation (annual)*: 8-10 inches *January min/max (°F)*: 18/40 *July min/max (°F)*: 60/92 *Frost free days*: 120-150	Desert shrubland: blackbrush, shadscale, Indian ricegrass, fourwing saltbrush, blue grama, mat saltbrush, saline wildrye, and galleta grass.	Shrubland. Recreation, rangeland, and wildlife habitat.
Escarpments (20e)	1,013	High, dissected cliffs, escarpments, mesa tops, and breaks with a wide elevational range. Includes the Book Cliffs and Roan Cliffs.	6,000-9,000/ 500-3,000	Quaternary alluvium and colluvium. Tertiary and Cretaceous sandstone, shale, siltstone, marlstone, limestone, and areas of oil shale. Rock outcrops are common.	Claysprings, Myton, Uzona	*Precipitation (annual)*: 15-25 inches (at higher elevations) 32 inches *January min/max (°F)*: 4/36 *July min/max (°F)*: 46/84 *Frost free days*: 60-90	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.
Uinta Basin Floor (20f)	39	Synclinal basin containing mountain-fed streams, alluvial terraces, outwash terraces, floodplains, hills, and ridges.	5,500-6,100/ 50-200	Quaternary colluvium, alluvium, and eolian deposits. Tertiary and Cretaceous sandstone and shale.	Potts, Walknolls, Veatch, Redcreek, Castner	*Precipitation (annual)*: 8-10 inches *January min/max (°F)*: 6/34 *July min/max (°F)*: 56/88 *Frost free days*: 90-120	Desert shrubland: saltbrush, greasewood, shadscale, Indian ricegrass, galleta grass, Wyoming big sagebrush, fourwing saltbrush, winterfat, needle-and-thread.	Shrubland. Rangeland, cropland, and wildlife habitat. Oil and gas production.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
21. Southern Rockies (Level III Ecoregion)								
Alpine Zone (21a)	3,690	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.	10,000-14,400+/ 400-2,500+	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.	Mirror, Bross, Whitecross, Henson, Teewinot	*Precipitation (annual)*: 35-70+ inches (deep winter snowpack) *January min/max (°F)*: -8/24 *July min/max (°F)*: 36/72 *Frost free days*: Less than 30	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, and alpine meadows. Recreation and wildlife habitat. Snowmelt provides water source to lower elevation ecoregions.
Crystalline Subalpine Forests (21b)	4,737	Glaciated. High mountains with steep slopes. High gradient perennial streams with boulder, cobble, and bedrock substrates.	8,500-10,000 in the north/ 9,000-12,000 in the south/ 400-2,500	Quaternary glacial till and colluvium. Tertiary intrusive rocks. 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.	Boyle, Granile, Kebler, Lakehelen, Leadville, Limber, Lucky, Peeler, Resort, Seitz	*Precipitation (annual)*: 30-58 inches (deep winter snowpack) *January min/max (°F)*: -4/28 *July min/max (°F)*: 36/72 *Frost free days*: 30-60	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.	Evergreens 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.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
Crystalline Mid-Elevation Forests (21c)	4,455	Partially glaciated. Low mountain ridges, slopes, and outwash fans. Moderate to high gradient perennial streams with boulder, cobble, and bedrock substrates.	7,000-9,000/ 400-1,000	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.	Boyett, Granile, Larkson, Peeler, Seitz, Wetmore, Legault, Sphinx, Catamount, Ivywild, Cabin, Frenchcreek, Pendant, Pierian, Raleigh, Rogert, Teoculli, Woodhall	*Precipitation (annual)*: 20-32 inches *January min/max (°F)*: 8/36 *July min/max (°F)*: 50/80 *Frost free days*: 60-90	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.
Foothill Shrublands (21d)	4,780	Unglaciated. Hills, ridges, and footslopes. Moderate to high gradient perennial, intermittent, and ephemeral streams with cobble, gravel, and sandy substrates.	Mostly 6,000-8,500, small areas up to 10,000/ 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 conglomerates. Precambrian metamorphic rocks: amphibolite, schist, gneiss, quartzite, quartz-pebble conglomerate, and marble.	Ring, Bond, Bronell, Brownsto, Coaldale, Potts, Kerhayden, Neville, Patent, Travessilla, Bowen, Bushvalley, Castner, Dominson, Embargo, Gelkie, Keeldar, Libeg, Lucky, Martinsdale, Nederland, Noden, Norriston, Pando, Parlin, San Isabel, St. Elmo	*Precipitation (annual)*: 12-20 inches *January min/max (°F)*: 10/36 *July min/max (°F)*: 46/84 *Frost free days*: 75-100	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.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
Sedimentary Subalpine Forests (21e)	6,196	Glaciated. High mountains with steep slopes. High gradient perennial streams with boulder, cobble, and bedrock substrates.	8,500-10,000 in the north, 9,000-12,000 in the south/ 400-1,500	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 Tops Mountains: Pre-Pennsylvanian Paleozoic limestone, sandstone, quartzite, and dolomite. Uncompahgre Plateau: Cretaceous sandstone and shale.	East: Ashcroft, Granile, Leadville, Limber, Seitz, Vulcan, Wetterhorn, Gralic, Storm, Adel, Leaps, Ruby. Southwest: Graysill, Scotch, Neddleton, Ryman. Uncompahgre Plateau: Gateway	*Precipitation (annual)*: 28-50 inches (Deep winter snowpack) *January min/max (°F)*: 2/32 *July min/max (°F)*: 40/76 *Frost free days*: 30-60	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.
Sedimentary Mid-Elevation Forests (21f)	7,532	Partially glaciated. Low mountain ridges, slopes and outwash fans. Moderate to high gradient perennial streams with boulder, cobble, and bedrock substrates.	7,000-9,000/ 400-1,000	Quaternary drift and colluvium. Faulted and folded Tertiary sedimentary rocks of limestone, siltstone, shale, and sandstone. Uncompahgre Plateau: Cretaceous sandstone and shale.	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	*Precipitation (annual)*: 20-32 inches *January min/max (°F)*: 6/34 *July min/max (°F)*: 44/84 *Frost free days*: 60-90	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.
Volcanic Subalpine Forests (21g)	3,940	Glaciated. High mountains with steep slopes. High gradient perennial streams with boulder, cobble, and bedrock substrates.	9,000-12,000/ 600-1,800	Quaternary drift and colluvium. Tertiary pyroclastic material, breccia, and volcanic ash flows, including basalt, andesitic lavas, and water-laid volcanics and conglomerates.	Frisco, Granile, Needleton, Seitz, Snowdon, Taglake, Clayburn, Hapgood, Lamphier, Wetopa. Rubble and rock outcrops.	*Precipitation (annual)*: 28-50 inches (deep winter snowpack) *January min/max (°F)*: 2/32 *July min/max (°F)*: 40/74 *Frost free days*: 30-60	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.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
Volcanic Mid-Elevation Forests (21h)	1,010	Partially glaciated. Low mountain ridges, slopes and outwash fans. Moderate to high gradient perennial streams with boulder, cobble, and bedrock substrates.	7,000-9,000/ 400-1,000	Quaternary drift and colluvium. Tertiary pyroclastic material, breccia, and volcanic ash flows, including basalt, andesitic lavas, and water-laid volcanics and conglomerates.	Frisco, Granile, Seitz, Shule, Cochetopa, Youman	*Precipitation (annual)*: 20-32 inches *January min/max (°F)*: 4/32 *July min/max (°F)*: 42/76 *Frost free days*: 60-90	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 neddlegrasses.	Evergreen and some deciduous forest. Timber production, summer livestock grazing, wildlife habitat, and recreation. Some gold mining.
Sagebrush Parks (21i)	2,098	High intermontane valleys. Moderate gradient perennial streams with cobble, gravel, and sandy substrates.	7,500-9,500/ 100-400	Quaternary alluvium, colluvium, and loess. Cretaceous and Tertiary sandstone, shale, siltstone, and conglomerate. Tertiary volcanic rocks.	Evanston, Gold Creek, Lucky, Parlin, Cheadle, Gas Creek	*Precipitation (annual)*: 10-16 inches *January min/max (°F)*: -4/28 *July min/max (°F)*: 44/78 *Frost free days*: 60-90	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.
Grassland Parks (21j)	1,254	High intermontane valleys. Moderate gradient perennial streams with cobble, gravel, and sandy substrates. Some wetlands.	7,900-9,800/ 100-400	Quaternary alluvium, colluvium, and sand. Tertiary siltstone, sandstone, conglomerate, volcanic basalt and ash-flow tuff. Precambrian gneiss, schist, and quartzite.	Gebson, Alvarado, Becks, Bushvalley, Coutis, Feltonia, Gas Creek, Gelkie, Hodden, Venable, Quander, Norriston, Morset, Libeg, Hoodle	*Precipitation (annual)*: 10-20 inches *January min/max (°F)*: 6/36 *July min/max (°F)*: 40/76 *Frost free days*: 60-90	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 III Ecoregion)								
San Louis Shrublands and Hills (22a)	993	Low mountains, hills, mesas, and foothills.	7,900-9,100/ 400-1,000	Quaternary gravels and alluvium. Tertiary igneous rocks of basalt flows, pre-ash flow andesitic lavas, breccias, tuffs, and conglomerates.	Travelers, Garita, Luhon, Space City, Costilla, Tolman, Bendire, Curecanti, Rock River, Stunner, Hesperus	*Precipitation (annual)*: 10-14 inches *January min/max (°F)*: 4/32 *July min/max (°F)*: 42/76 *Frost free days*: 30-60	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.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
San Louis Alluvial Flats and Wetlands (22b)	1,217	Irregular plains. Wetlands, springs, and areas with high water table. Few large perennial streams which originate in mountains.	7,500-8,000/ 10-100	Quaternary alluvium or gravel, sand, and silt.	Graypoint, Platoro, Dunul, San Arcacio, Zinzer, Acacio, Alamosa, Lajara, Vastine, Gunbarrel, Mosca, San Luis	*Precipitation (annual)*: 6-10 inches *January min/max (°F)*: 0/34 *July min/max (°F)*: 46/80 *Frost free days*: 60-90	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.
Salt Flats (22c)	866	Irregular plains and alkaline basins.	7,400-7,700/ 10-100	Quaternary alluvium of gravel, sand, and silt.	Space City, Costilla, Cotopaxi, Hooper, San Luis, Corlett	*Precipitation (annual)*: 6-8 inches *January min/max (°F)*: 0/34 *July min/max (°F)*: 46/80 *Frost free days*: 60-90	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.
Sand Dunes and Sand Sheets (22e)	254	Large dunes, low parabolic and longitudinal shrub-stabilized dunes, and sand sheets.	7,500-8,900/ 100-700	Quaternary eolian sand deposits, dunes, and sand sheets.	Cotopaxi, Space City, Costilla, Alamosa, Lajara, Vastine	*Precipitation (annual)*: 8-12 inches *January min/max (°F)*: 0/34 *July min/max (°F)*: 44/80 *Frost free days*: 60-90	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 III Ecoregion)								
Rolling Sand Plains (25b)	4,620	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.	3,500-5,100/ 25-150	Quaternary eolian sand sheets and dunes. Underlain by Tertiary claystones and sandstones of the Ogallala Formation.	Valent, Vona, Julesburg, Haxtun, Jayem, Busher, Bijou	*Precipitation (annual)*: 12-20 inches *January min/max (°F)*: 14/42 *July min/max (°F)*: 60/92 *Frost free days*: 140-160	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.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
Moderate Relief Plains (25c)	6,206	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.	3,600-6,500/ 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.	Olney, Ascalon, Platner, Stoneham, Nucla, Kim, Dix, Altvan, Keith, Kuma, Ulysses, Colby, Norka	*Precipitation (annual)*: 12-18 inches *January min/max (°F)*: 14/44 *July min/max (°F)*: 60/92 *Frost free days*: 140-160	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.
Flat to Rolling Plains (25d)	13,219	Flat to rolling plains. Intermittent streams, with a few large perennial streams. Silty and sandy substrates. Small, open, depressional wetland "playas" scattered throughout region.	3,600-5,700/ 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.	Stoneham, Fort Collins, Olney, Richfield, Keith, Colby, Wages, Rosebud, Manter, Ascalon. Platner, Haxtun, Rago, Alliance, Canyon, Weld, Norka, Adena	*Precipitation (annual)*: 12-18 inches *January min/max (°F)*: 16/46 *July min/max (°F)*: 62/94 *Frost free days*: 140-180	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.
Front Range Fans (25l)	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).	4,800-5,300/ 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.	Altvan, Ascalon, Larimer, Stoneham, Dacono, Nunn, Renohill, Shingle, Otero, Thedalund, Olney, Ulm, Engelwood, Nederland, Kutch, Denver	*Precipitation (annual)*: 14-18 inches *January min/max (°F)*: 12/40 *July min/max (°F)*: 56/88 *Frost free days*: 120-140	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.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
26. Southwestern Tablelands (Level III Ecoregion)								
Piedmont Plains and Tablelands (26e)	13,373	Irregular and dissected plains. Intermittent streams, with few large perennial streams which mostly originate in mountains or higher relief areas. Silty and sandy substrates.	3,600-6,500/ 50-200	Quaternary alluvium and eolian deposits of loess, silt, and sand. Cretaceous shale, limestone, and sandstone.	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	*Precipitation (annual)*: 12-16 inches, with 10-12 inches in low lying area between Pueblo and Las Animas *January min/max (°F)*: 14/46 *July min/max (°F)*: 60/92 *Frost free days*: 120-160	Shortgrass prairie: blue grama, green needlegrass, buffalograss, needle-and-thread, and red threeawn. Also may include mixedgrass 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.
Mesa de Maya/Black Mesa (26f)	565	Broad mesa, knobs, and dissected plains with deep canyons. Rough, rocky, steep slopes are common.	4,500-6,200/ 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.	Capulin, Torreon, Apache, Travessilla, Carnero, Fruitland, Manzano, Alicia, Kim. Rock outcrops	*Precipitation (annual)*: 14-18 inches *January min/max (°F)*: 16/46 *July min/max (°F)*: 58/90 *Frost free days*: 100-150	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 pineoak woodlands with a few isolated areas of mesquite shrublands.	Woodland, rangeland, and wildlife habitat.
Purgatoire Hills and Canyons (26g)	1,041	Dissected plains and tablelands with some hills, steep canyons, and rock outcrops.	4,900-7,400/ 100-700	Quaternary alluvium and colluvium. Cretaceous sandstone and shale. Jurassic sandstone, claystone, and shale. Triassic sandstone and siltstone. Permian siltstone, dolomite, and sandstone.	Travessilla, Baca, Manvel, Minnequa, Penrose	*Precipitation (annual)*: 12-16 inches *January min/max (°F)*: 14/46 *July min/max (°F)*: 58/90 *Frost free days*: 100-150	Juniper woodlands and shortgrass prairie. Rocky Mountain juniper, oneseed juniper, Utah juniper, blue grama, and buffalograss.	Woodland and wildlife habitat.
Pinyon-Juniper Woodlands and Savannas (26h)	997	Dissected plains and tablelands with some scattered ridges and hills.	5,100-7,100/ 100-500	Quaternary alluvium and colluvium. Cretaceous shale, limestone, and sandstone.	Travessilla, Baca, Noden, Bond, Razor, Midway, Limon, Manvel, Minnequa, Penrose, Wetmore (in west at the base of mountains). Rock outcrops.	*Precipitation (annual)*: 12-20 inches with highest near the mountains *January min/max (°F)*: 16/44 *July min/max (°F)*: 56/88 *Frost free days*: 90-120	Pinyon-juniper woodlands: pinyon pine, Rocky Mountain juniper, eastern redcedar, and oneseed juniper.	Woodland and wildlife habitat.

Level IV Ecoregion		Physiography		Geology (Surface and Bedrock)	Soil Series	Climate	Natural Vegetation	Land Use and Land Cover
Ecoregion Name (Number)	Area (Square Miles)	Physical Characteristics	Elevation (Feet)					
Pine-Oak Woodlands (26i)	580	Dissected plains and hills.	6,000-7,500/ 100-300	Quaternary alluvium and colluvium. Tertiary and Cretaceous arkosic, conglomerate, sandstone, claystone, and shale.	Brussett, Peyton, Kettle, Weld, Fondis, Bresser	*Precipitation (annual)*: 14-20 inches *January min/max (°F)*: 10/36 *July min/max (°F)*: 50/80 *Frost free days*: 90-120	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, wildlife habitat. Increasing urban and residential development.
Foothill Grasslands (26j)	1,805	Dissected and irregular plains.	5,900-7,000/ 50-200	Quaternary alluvium. Tertiary and Cretaceous arkosic conglomerate, sandstone, claystone, and shale.	Bresser, Truckton, Ellicott, Stapleton, Columbine, Cushman, Ascalon	*Precipitation (annual)*: 14-20 inches *January min/max (°F)*: 12/40 *July min/max (°F)*: 52/84 *Frost free days*: 100-150	Foothils 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.
Sand Sheets (26k)	566	Rolling plains with stabilized sand sheets and areas of low sand dunes.	3,500-5,900/ 25-100	Quaternary eolian sands and alluvial gravels and sands. Cretaceous shale and sandstone.	Valent, Vona, Bijou, Wigton	*Precipitation (annual)*: 10-16 inches *January min/max (°F)*: 14/46 *July min/max (°F)*: 60/88 *Frost free days*: 120-150	Sandsage prairie: sand sagebrush, sand bluestem, prairie sandreed, blowout grass, lemon scurfpea, and little bluestem.	Grassland, some shrubland and rangeland.

Source: Chapman, S.S., G.E. Griffth, J.M. Omernik, A.B. Price, J. Freeouf, and D.L. Schrupp. 2006. *Ecoregions of Colorado* (color poster with map, descriptive text, summary tables, and photographs). U.S. Geological Survey, Reston, Virginia (map scale 1:1,200,000). <http://www.epa.gov/wed/pages/ecoregions/co_eco.htm>. Accessed October 1, 2010.