Ecoregions of Utah

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. Ecoregions are directly applicable to the immediate needs of state agencies, including the development of biological criteria and water quality standards and the establishment of management goals for nonpoint-source pollution. They are also relevant to integrated ecosystem management, an ultimate goal of most federal and state resource management agencies.

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] 2000). 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), Griffith and others (1994), and Gallant and others (1989).

Utah is made up of arid deserts and canyonlands, salt flats, wetlands, semiarid shrublands, irrigated valleys, woodlands, forested mountains, and glaciated peaks. Ecological diversity is enormous. There are 7 level III ecoregions and 37 level IV ecoregions in Utah and most 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 2000; Omernik 1987). This poster is part of a collaborative project primarily between USEPA Region VIII, USEPA National Health and Environmental Effects Research Laboratory (Corvallis, Oregon), Utah Department of Environmental Quality, Utah Division of Wildlife Resources, Utah Department of Natural Resources, 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)-Earth Resources Observation Systems (EROS) Data Center.

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 Utah, where agreement has been reached among multiple resource management agencies, is a step toward attaining consensus and consistency in ecoregion frameworks for the entire nation.

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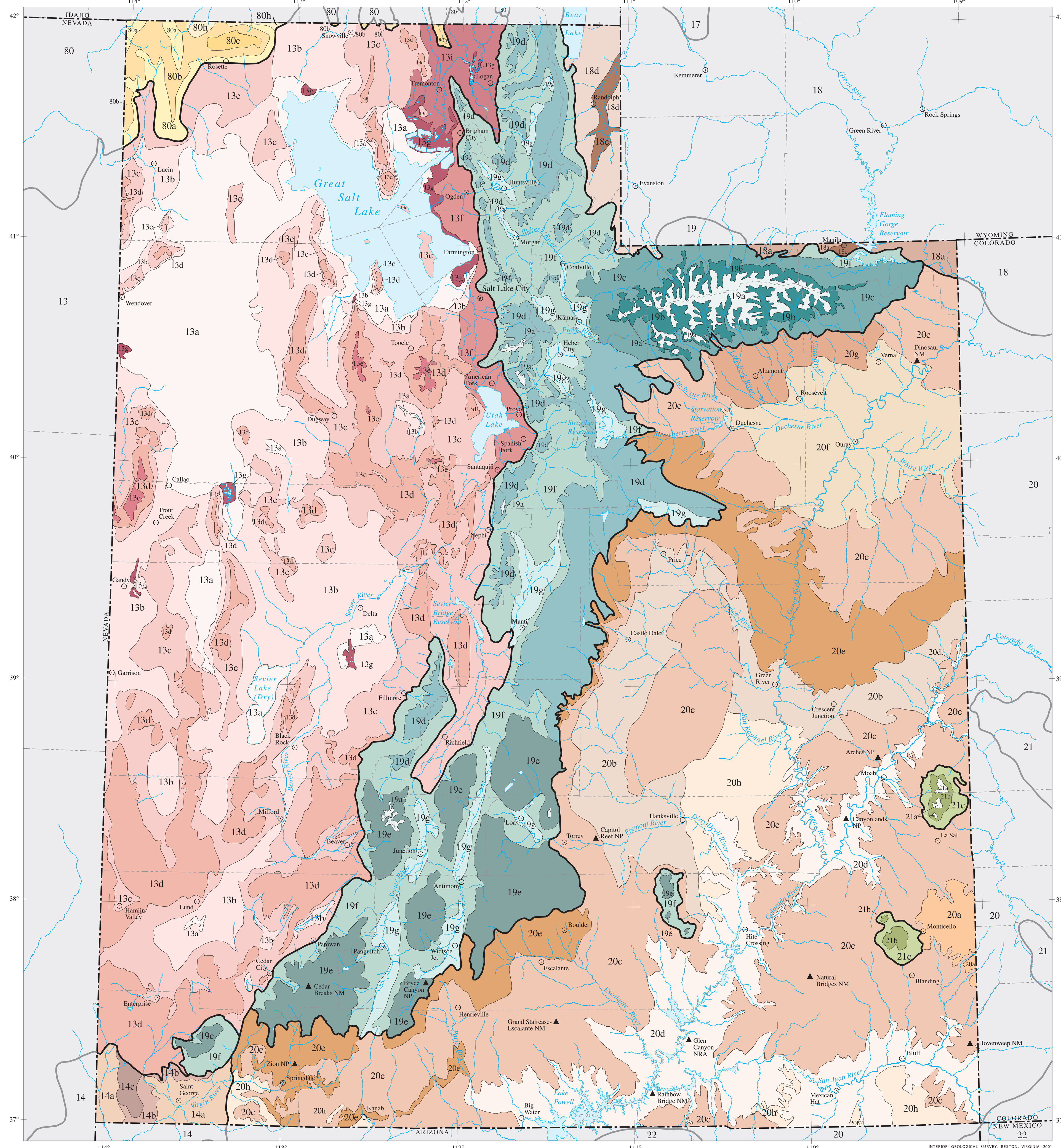


13 Central Basin and Range
- 13a Salt Deserts
- 13b Shadscale-Dominated Saline Basins
- 13c Sagebrush Basins and Slopes
- 13d Woodland- and Shrub-Covered Low Mountains
- 13e High Elevation Carbonate Mountains
- 13f Moist Wasatch Front Footslopes
- 13g Wetlands
- 13i Malad and Cache Valleys

14 Mojave Basin and Range
- 14a Creosote Bush-Dominated Basins
- 14b Arid Footslopes
- 14c Mountain Woodland and Shrubland

18 Wyoming Basin
- 18a Rolling Sagebrush Steppe
- 18c Wet Valleys
- 18d Semiarid Bear Hills

19 Wasatch and Uinta Mountains
- 19a Alpine Zone
- 19b Uinta Subalpine Forests
- 19c Mid-elevation Uinta Mountains
- 19d Wasatch Montane Zone
- 19e High Plateaus
- 19f Semiarid Foothills
- 19g Mountain Valleys

20 Colorado Plateaus
- 20a Monticello Upland
- 20b Shale Deserts
- 20c Semiarid Benchlands and Canyonlands
- 20d Arid Canyonlands
- 20e Escarpments
- 20f Uinta Basin Floor

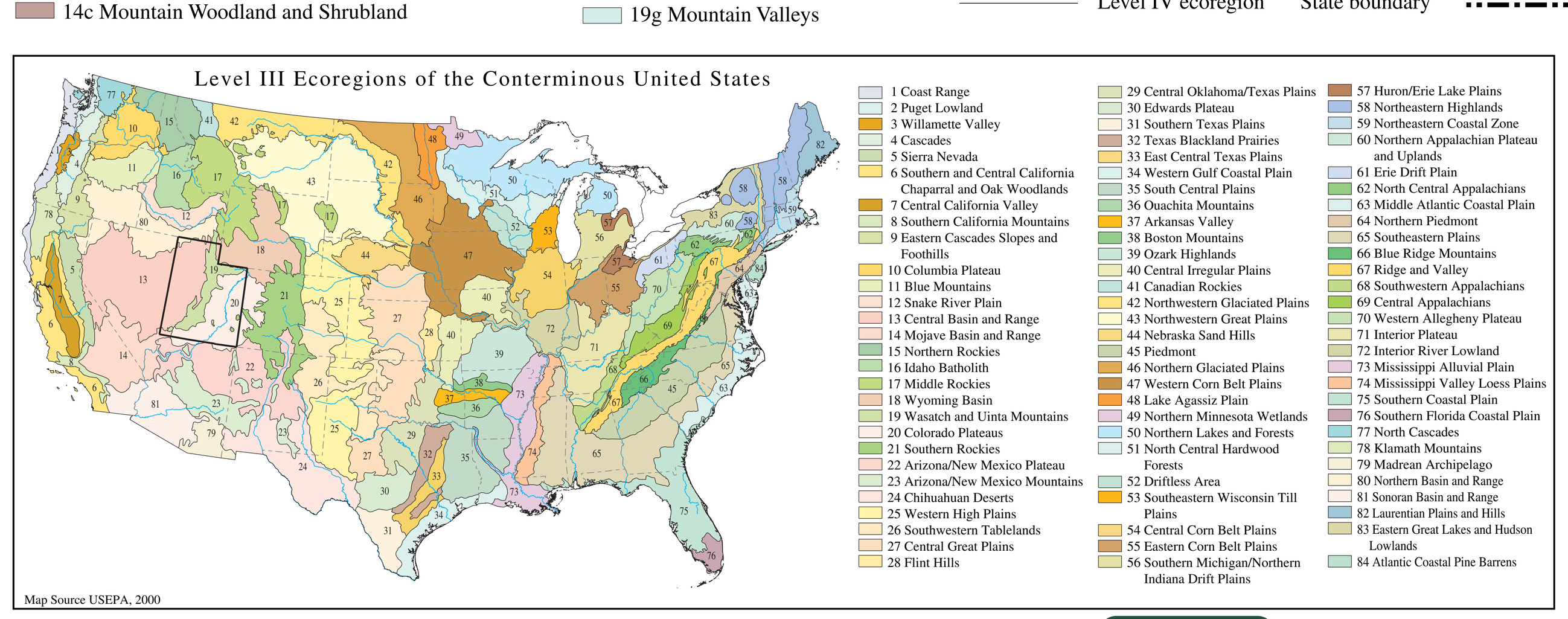
20 Colorado Plateaus (continued)
- 20g Northern Uinta Basin Slopes
- 20h Sand Deserts

21 Southern Rockies
- 21a Alpine Zone
- 21b Subalpine Forests
- 21c Dry Forests and Shrublands

80 Northern Basin and Range
- 80a Dissected High Lava Plateau
- 80b Semiarid Hills and Low Mountains
- 80c High Elevation Forests and Shrublands
- 80h Saltbush-Dominated Valleys
- 80i Sagebrush Steppe Valleys

Level III ecoregion
Level IV ecoregion
County boundary
State boundary

SCALE 1:1 175 000
15 10 5 0 30 60 mi
30 20 10 0 60 120 km
Albers Equal Area Projection
Standard parallels 38° N and 41° N



Map Source USEPA, 2000

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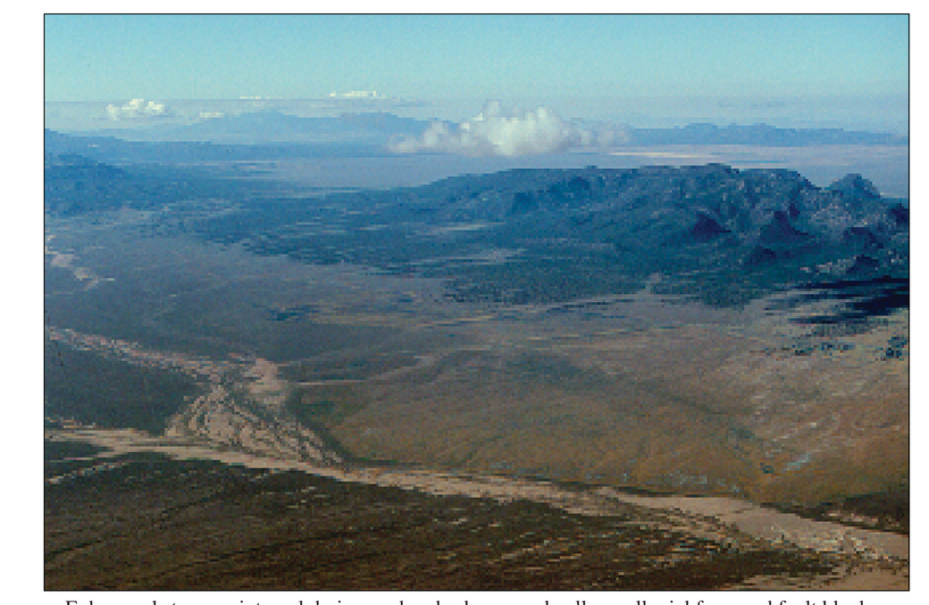
CITING THIS POSTER: Woods, A.J., Lammers, D.A., Bryce, S.A., Omernik, J.M., Denton, R.L., Domeier, M., and Comstock, J.A., 2001, Ecoregions of Utah (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,175,000).

This project was partially supported by funds from the USEPA-Office of Research and Development - Regional Applied Research Effort (RARE) program and USEPA-Office of Water, Biological Criteria Program.

STATE OF UTAH NATURAL RESOURCES Division of Wildlife Resources

13. Central Basin and Range

Ecoregion 13 is composed of northerly trending, fault-block ranges and intervening, drier basins. Valleys, slopes, and alluvial fans are either shrub and grass-covered, shrub-covered, or barren. Woodland, mountain brush, and scattered open forests are found at higher elevations on mountain slopes. The potential natural vegetation is, in order of increasing elevation and ruggedness, saltbush-greasewood, Great Basin sagebrush, juniper-pinyon woodland, and scattered western spruce-fir forest. In addition, tule marshes occur locally, especially along the Great Salt Lake shoreline. The Central Basin and Range (13) is internally-drained by ephemeral streams. In Utah, most of Ecoregion 13 lower than about 5,200 feet elevation was inundated by Pleistocene Lake Bonneville. Extensive playas occur and are nearly flat, clayey, and salty. In general, Ecoregion 13 is drier than the Wasatch and Uinta Mountains (19), cooler than the Mojave Basin and Range (14), and warmer and drier than Ecoregions 12 and 80. Ecoregion 13 has more shrubland and less grassland than the Snake River Plain (12) but lacks both the creosote bush of Ecoregion 14 and the extensive, dense forests of Ecoregion 19. Soils grade upslope from mesic Aridisols to frigid Mollisols; Entisols also occur on fans, floodplains, and valley bottoms. Basin soils of Ecoregions 13a, 13b, and 13c are typically more saline and alkaline than those of the sagebrush Steppe Valleys (80i) to the north. The land is primarily used for grazing and a greater percentage is used for livestock grazing than in Ecoregion 14. In addition, some irrigated cropland is found in valleys near mountain water sources. Military bases also are found in Ecoregion 13 and are of environmental significance because of their large area and their unique land uses and management practices.


Ephemeral streams, internal drainage, dry shrub-covered valleys, alluvial fans, and fault block mountains are characteristic of the Central Basin and Range (13). In this aerial photograph taken near Lund, big sagebrush grows in the semi-arid valleys and juniper-pinyon woodland is found at higher elevations on rocky, rugged mountain slopes.

13a The **Salt Deserts** ecoregion is nearly level, internally-drained, mostly barren, arid, and nonarable. It contains playas, salt flats, mud flats, and saline lakes. Water levels and salinity fluctuate seasonally and yearly. Lakes, including the Great Salt Lake, can be too saline for fish. Soils are mostly clayey and poorly-drained. Vegetation, where present, is sparse and composed of salt-tolerant plants such as salicornia and saltgrass. Ecoregion 13a is used for recreation, transportation, defense installations, and industry including salt production.

13b The **Shadscale-Dominated Saline Basins** ecoregion is arid, internally-drained, and gently sloping to nearly flat. Light-colored soils with high salt and alkali content occur and are dry for extended periods. Vegetation is salt- and drought-tolerant. It is dominated by shadscale, winterfat, and greasewood and is distinct from the Wyoming big sagebrush of the less saline Ecoregion 13c and the mostly barren Salt Deserts (13a). Ecoregion 13b is primarily rangeland, but large livestock and poultry farms are found locally. Irrigated farming is less common than in Ecoregion 80h or the densely populated Moist Wasatch Front Footslopes (13f).

13c The **Sagebrush Basins and Slopes** ecoregion is semiarid. The potential natural vegetation is Great Basin sagebrush. It is dominated by Wyoming big sagebrush but perennial bunchgrasses occur and become increasingly common northward as available moisture increases. However, cool season grasses are less abundant than in Ecoregions 80a and 80i, which are wetter, cooler, and have a potential natural vegetation of sagebrush steppe. The major land use is grazing, but feedlots, dairy operations, and irrigated cropland are found locally. Ecoregion 13c includes valleys, alluvial fans, and mountain flanks that are not as saline nor as arid as Ecoregions 13a or 13b. It is less rocky, rugged, and wooded than Ecoregion 13d and not as level as Ecoregions 13a and 13b.

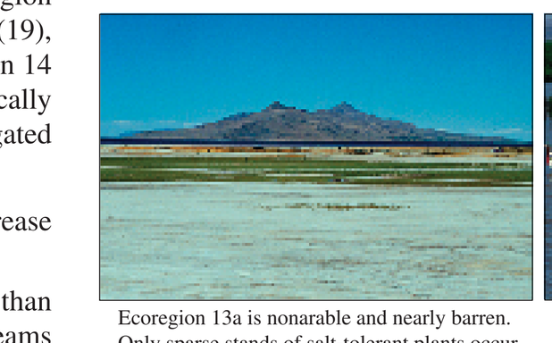
13d The rocky **Woodland- and Shrub-Covered Low Mountains** ecoregion is covered by woodland or, at higher elevations, by mountain brush. Its vegetation mosaic is distinct from the surrounding ecoregions. Its mountain slopes, hills, and alluvial fans are higher, wetter, rockier, and more rugged than Ecoregions 13c and 13i and lower and drier than Ecoregion 13e. Entisols and Mollisols occur and are often stony or shallow; Aridisols are not as common as in Ecoregions 13b and 13c. Juniper is typically found at lower elevations than pinyon or is intermixed with it. Stock grazing is common and trees have been extensively cleared in an effort to increase livestock forage. Bitterbrush and western serviceberry are important browse for mule deer.

13e The disjunct **High Elevation Carbonate Mountains** ecoregion is higher, wetter, and more rugged than nearby ecoregions and is largely underlain by limestone, dolomite, or quartzite. Only a few streams originate in its fault-block mountains and provide water to lower and drier ecoregions. Mollisols support subalpine fir, Engelmann spruce, bristlecone pine, limber pine, Douglas-fir, mountain big sagebrush, and aspen. Forest stands are most extensive on upper, north facing slopes. Carbonates influence floristic composition, extend the elevational limits of trees, decrease vegetation density, and affect the quantity and quality of water.

13f The **Moist Wasatch Front Footslopes** ecoregion supports the bulk of Utah's population and commercial activity. It is fed by perennial streams and aqueducts that originate in the adjacent Wasatch Range. Irrigated cropland growing alfalfa, vegetables, and small grains as well as orchards are common outside of urban areas. Land use has affected stream quality and irrigation diversions have reduced stream flow.

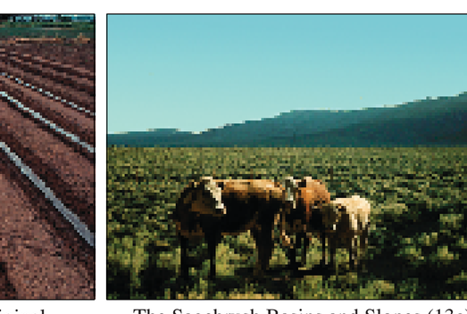
13g The nearly level **Wetlands** ecoregion contains rushes, reed grasses, and areas of open water. It is critical habitat for migratory birds and many state and federal wildlife refuges are found within it. Water levels are often managed, but, nevertheless, marshes can be periodically contaminated by rising saline lakes or drowned by high river runoff. Soils are poorly-drained or very poorly-drained and often salty. Potential natural vegetation consists of tule marshes and differs from that of nearby Ecoregions 13a, 13b, 13c, 13i, 80a, and 80i.

13i The **Malad and Cache Valleys** ecoregion contains wide terraces, narrow floodplains, and alluvial fans. Mountain-fed perennial streams and canals provide water to pastureland, municipalities, and hay, small grain, sugar beet, and fruit crops. Ecoregion 13i is cooler, has a shorter growing season, and has less lake influence than Ecoregion 13f. It is wetter, more extensively farmed, and more populated than Ecoregion 13c. Mollisols occur and contrast with the Aridisols of Ecoregion 13c. The Cache Valley has a shorter growing season and more snow in winter than the Malad Valley.


Ecoregion 13a is nonarable and nearly barren. Only sparse stands of salt-tolerant plants occur.


The marshland and open water of Ecoregion 13g support plentiful birdlife.


Irrigated farming has modified the original habitat of Ecoregion 13f. Resultant soil erosion and runoff has increased the turbidity and sedimentation rates of surface waters.


The Sagebrush Basins and Slopes (13c) ecoregion is dominated by Wyoming big sagebrush and primarily used as rangeland.

14. Mojave Basin and Range

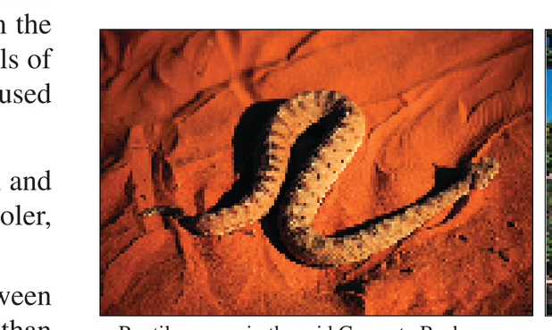

Ecoregion 14a is dry, warm, and dominated by creosote bush. Land use is mostly grazing, although forage is often limited. Near St. George, urban and suburban areas are rapidly growing.

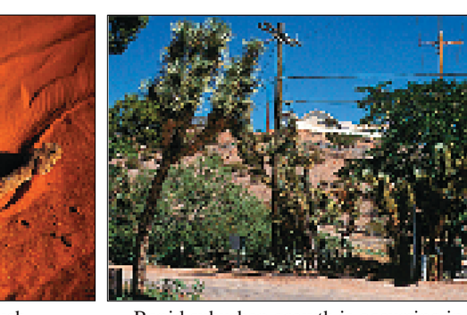
Ecoregion 14 is composed of basins and scattered mountains that are generally lower, warmer, and drier than those of the Central Basin and Range (13). The potential natural vegetation is mapped as creosote bush and is distinct from the saltbush-greasewood, Great Basin sagebrush, sagebrush steppe, and juniper-pinyon woodlands that occur to the north in the Central Basin and Range (13) and Northern Basin and Range (80); it is also distinct from the creosote bush-bur sage and the palo verde-cactus shrub that occur in the Sonoran Basin and Range (81) to the south. Soils are mostly Entisols and Aridisols and have a thermic temperature regime; they are warmer than the soils of Ecoregion 13. Most of Ecoregion 14 is federally-owned and there is relatively little grazing activity because of the lack of water and forage for livestock. Heavy use of off-road vehicles and motorcycles in some areas has caused severe wind and water erosion problems.

14a The **Creosote Bush-Dominated Basins** ecoregion is composed of alluvial fans, valleys, and scattered buttes. Ecoregion 14a is lower in elevation, warmer, and has a higher average potential evapotranspiration than more northerly ecoregions. Soils are alkaline and have a thermic temperature regime. They are warmer than the soils of Ecoregion 13 and support creosote bush, Joshua tree, blackbrush, big sagebrush, and associated grasses. Some of its plant species, including Joshua tree, are typical of the Mojave Desert and are absent from the rest of Utah. Fauna, particularly reptiles and birds, can also be distinctive; many species occur nowhere else in Utah. Today, rangeland is common and irrigated cropland occurs near water sources. Urban and suburban development is rapidly expanding in the Saint George area.

14b The **Arid Footslopes** ecoregion is composed of footslopes, alluvial fans, hills, basalt flows, mesas, and badlands between 3,000 and 5,000 feet elevation in southwesternmost Utah. Sparsely vegetated slopes are characteristic and have a high sediment yield during summer thunderstorms. The soils are Petrocalcids that sustain Wyoming big sagebrush, blackbrush, Mormon tea, yellowbrush, galleta, Indian ricegrass, cheatgrass, and cholla. The vegetation is distinct from the warmer, lower Creosote Bush-Dominated Basins (14a) and the cooler, higher Mountain Woodland and Shrubland (14c).

14c The **Mountain Woodland and Shrubland** ecoregion is found in extreme southwestern Utah between 4,000 and 7,800 feet elevation. Its mountains and mesa tops are higher and temperatures are cooler than those of the surrounding Arid Footslopes (14b). Nevertheless, Ecoregion 14c has no perennial streams and its Mollisols and Entisols support only sparse vegetation. Juniper-pinyon woodland and mountain brush occur; vegetation is distinct from the creosote bush and sagebrush that are found nearby in Ecoregions 14a and 14b, respectively. The fauna is composed of Mojave Desert indicators including the desert tortoise and the speckled rattlesnake. In Utah, Ecoregion 14c is confined to the Beaver Dam Mountains, an eroded fault block with a core of Precambrian metamorphic rock.


Reptiles occur in the arid Creosote Bush-Dominated Basins (14a). A sidewinder, pictured here, inhabits sandy areas of the Mojave and Sonoran deserts.
Photo: © Lynn Chamberlain


Rapid suburban growth is occurring in the dry, warm, and sunny Creosote Bush-Dominated Basins (14a). Here residential development in St. George is shown next to Joshua trees that occur in the Mojave Desert.

18. Wyoming Basin

Ecoregion 18 is a broad intermontane basin containing rolling plains, high hills, mesas, and low mountains. It is dominated by arid grasslands and shrublands. Ecoregion 18 is somewhat drier than the Northwestern Great Plains (43) to the northeast, lacks the extensive pinyon-juniper woodland of the Colorado Plateaus (20) to the south, and does not have the extensive forests of the neighboring Middle Rockies (17), Wasatch and Uinta Mountains (19), and Southern Rockies (21). Much of the ecoregion is used for livestock grazing, although many areas lack sufficient vegetation to adequately support this activity in the long term. Ecoregion 18 also contains major oil and natural gas fields.

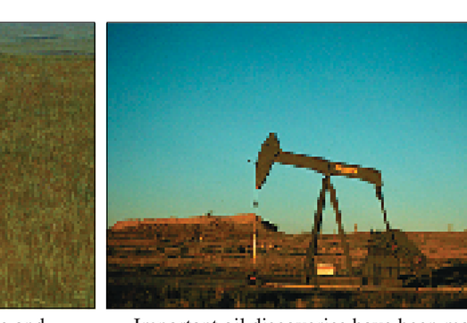
18a The **Rolling Sagebrush Steppe** is composed of semiarid rolling plains, hills, and mesas; wetter hills, ridges, and outwash fans occur near the Uinta Mountains. Soils have an aridic, bordering on ustic, moisture regime and receive more moisture during the growing season than the xeric soils of the Semiarid Bear Hills (18d). Big sagebrush and bluebunch wheatgrass are common and unlike the vegetation of the neighboring Wasatch and Uinta Mountains (19) and Colorado Plateaus (20). Ecoregion 18a is primarily rangeland. Repeated fires and grazing have affected the natural vegetation and, today, introduced annual grasses can be common.

18c The **Wet Valleys** ecoregion consists of very poorly-drained, nearly flat floodplains, low terraces, and alluvial fans along the Bear River. The ecoregion is characterized by cold winters, frigid soils, and a short growing season. Wetlands are common and are dominated by sedges, rushes, cattails, and marsh grasses. Its Mollisols and Entisols support irrigated hayland, meadow pasture, and rangeland. Land use, terrain, and drainage are all different from neighboring ecoregions.

The Wyoming Basin (18) is a vast sagebrush steppe. Its rolling plains, mesas, and high hills are most extensive in Wyoming but they also extend into Utah, Colorado, Idaho, and Montana. Grazing pressure and repeated fires have affected its natural vegetation and introduced annual grasses can be common. The Utah portion is flanked by the high Wasatch and Uinta Mountains (19) and often contains foothills.

18d The **Semiarid Bear Hills** ecoregion is located in the rainshadow of high mountains and is dry during the summer. Soils characteristically have a xeric moisture regime and are drier during the growing season than the ustic soils of Ecoregion 18a. The terrain is hilly and is distinct from the Rolling Sagebrush Steppe (18a), the nearly flat Wet Valleys (18c), and the rugged Wasatch and Uinta Mountains (19). Bunchgrasses and big sagebrush are common and contrast with the forests of neighboring, mountainous ecoregions. Today, Ecoregion 18d is primarily rangeland. The land use mosaic contrasts with that of Ecoregions 18c and 19.


Pronghorn antelope coexist with cattle and sheep on the rangeland of the Rolling Sagebrush Steppe (18a).


Important oil discoveries have been made since the 1970s in the Wyoming Basin (18).

19. Wasatch and Uinta Mountains

Ecoregion 19 is composed of high, glaciated mountains, dissected plateaus, foothills, and intervening valleys. It includes the extensively glaciated Uinta Mountains, the Wasatch Range, and the Wasatch Plateau. Agricultural valleys occur especially in the eastern part of the Wasatch Range. The Wasatch Front is steeper, more rugged, and wetter than more easterly parts of the Wasatch Range. Alkaline dust from the Great Basin does not buffer high elevation surface waters against acidification. Streams draining the quartzite-dominated Uinta Mountains and portions of the Wasatch Front that are underlain by acidic intrusive volcanics tend to be non-alkaline, low in nutrients, and low in total dissolved solids. Above an elevation of about 11,000 feet, alpine meadows, rockland, and talus slopes occur and are especially widespread in the Uinta Mountains. Between about 8,000 and 11,000 feet elevation, subalpine forests, Douglas-fir forests, and aspen parkland are widespread with ponderosa pine and limber pine also occurring on the high volcanic plateaus. Between approximately 5,000 and 8,000 feet elevation, juniper-pinyon woodland and mountain mahogany-oak scrub communities occur, with the latter more prevalent in the north than in the south. Lodgepole pine is less widespread and summer livestock grazing is more common than in the Middle Rockies (17). Unlike in the maritime-influenced Northern Rockies (15), Pacific indicator tree species such as grand fir are absent from Ecoregion 19. The ecoregion is used for logging, recreation, homes, and summer grazing.


Engelmann spruce, subalpine fir, and Douglas-fir forests and aspen parkland commonly grow on the mountains and volcanic plateaus of the Wasatch and Uinta Mountains (19). At lower elevations in the Semiarid Foothills (19f), juniper-pinyon woodland and mountain mahogany-oak scrub communities are found.

19a The **Alpine Zone** occurs on mountain tops above timberline, about 11,000 feet elevation. It is especially extensive in the Uinta Mountains. Glacial features dominate the landscape. Meadows and rockland are common and contrast with the dense forests of neighboring, lower ecoregions. Ecoregion 19a is higher and receives more precipitation than other parts of Ecoregion 19. Runoff from its deep snow pack is a major source of summer water for lower, more arid ecoregions. Soils are mostly Inceptisols. They have a cryic temperature regime and are often stony, shallow, and acidic. Ecoregion 19a is used for seasonal grazing and recreation.

19b The wet, glaciated **Uinta Subalpine Forests** ecoregion contains high elevation mountains, glaciated basins that drop into deep canyons, and many lakes. Elevations range from 10,000 feet to timberline, about 11,000 feet. Ecoregion 19b is higher, wetter, more extensively glaciated, and less rugged than Ecoregion 19c but does not receive as much precipitation as the higher Alpine Zone (19a). Its Inceptisols and Alfisols support Engelmann spruce, lodgepole pine, and subalpine fir. Such subalpine forests are far more extensive in the Uinta Mountains than in the less massive Wasatch Range. Logging, seasonal grazing, and recreational activity are important land uses. Snow melt provides water to lower, more arid ecoregions.

19c The **Mid-elevation Uinta Mountains** ecoregion is glaciated and forested. It occupies the elevational zone between 8,000 and 10,000 feet in the Uinta Mountains. Here Douglas-fir, ponderosa pine, aspen parkland, and, in the north, lodgepole pine grow. The vegetation is distinct from the lower juniper-pinyon woodlands of Ecoregions 20c and 20g and the higher, wetter Uinta Subalpine Forests (19b) and Alpine Zone (19a). Ecoregion 19c's terrain is more rugged than Ecoregion 19b. Its deep canyons contain many good quality, perennial streams that are fed by meltwater from the high Uinta Mountains. They provide water to lower, more arid ecoregions.

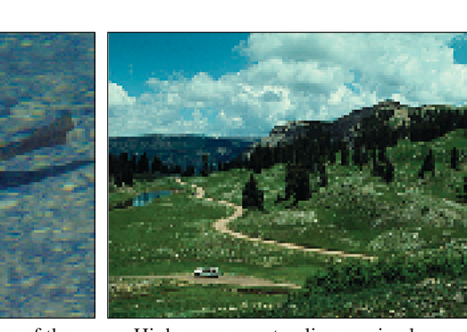
19d The partially glaciated **Wasatch Montane Zone** consists of forested mountains and plateaus underlain by sedimentary and metamorphic rocks. It is lithologically distinct from the igneous rocks of Ecoregion 19e. Douglas-fir and aspen parkland are common and Engelmann spruce and subalpine fir grow on steep, north-facing slopes. Vegetation is unlike the lower juniper-pinyon woodland and mountain brush of Ecoregion 19f or the alpine meadows of Ecoregion 19a. Perennial streams provide water to lower, more arid regions.

19e The **High Plateaus** ecoregion is largely capped by flat-lying igneous rock and is lithologically distinct from the Wasatch Montane Zone (19d). Elevations usually range from about 8,000 to 11,000 feet and are accompanied by differences in precipitation and temperature. The subalpine fir, Engelmann spruce, Douglas-fir, and aspen communities of plants and animals are widespread but the ponderosa pine community also occurs at lowest elevations. The vegetation is unlike the juniper-pinyon woodland and mountain brush found at lower elevations in Ecoregion 19f and the meadows that occur at higher elevations in Ecoregion 19a. Land use includes logging, seasonal grazing, and recreation.

19f The **Semiarid Foothills** ecoregion is found between about 5,000 and 8,000 feet elevation. Widely spaced juniper and pinyon typically occur in a matrix of sagebrush, grama grass, mountain mahogany, and Gambel oak. Maple-oak scrub is common in the north but, southward, it is gradually replaced by pinyon-juniper woodland at lower elevations and ponderosa pine at upper elevations. Overall, the vegetation is distinct from Ecoregion 19g, which is lower and drier, and Ecoregions 19d and 19e, which are higher and wetter. Livestock grazing is common. Some rangeland has been cleared of trees and reseeded to grasses.

19g The unforested **Mountain Valleys** ecoregion contains terraces, flood plains, alluvial fans, and hills. It is affected by cold temperatures and has a short growing season. Potential natural vegetation is mostly Great Basin sagebrush. It is distinct from the juniper-pinyon woodland and mountain mahogany-oak scrub of Ecoregion 19f. Today, irrigated cropland, irrigated pastureland, and rangeland are common. Turkey farms, feedlots, and dairy operations occur locally. Land use contrasts with that of nearby high plateaus and mountains.

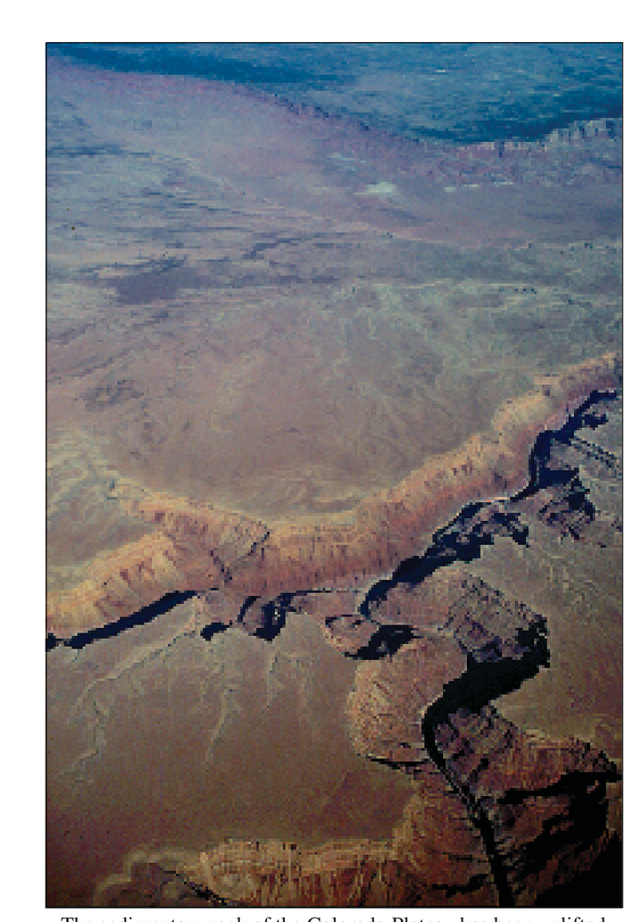

Cutthroat trout are found in the streams of the Wasatch and Uinta Mountains (19).
Photo: Bob Lillie


High areas near treeline receive large amounts of precipitation and have been extensively glaciated. Cirques, tarns, moraines, and rockland are common and are used for recreation and seasonal grazing.


The forests of the Wasatch and Uinta Mountains (19) are logged. Timber harvest can cause significant erosion, stream turbidity, and habitat modification.


Seasonal, high elevation cattle grazing is widespread in the meadows and forests of the upper Wasatch and Uinta Mountains (19).

20. Colorado Plateaus


The sedimentary rock of the Colorado Plateau has been uplifted and deeply dissected. Chasms, cliffs, valleys, and mesas occur. Dry, hot canyonlands are found at lowest elevations and are dominated by blackbrush, tamarisk, and bare rock. At higher elevations, semiarid benches covered in shrubland or woodland occur.
Photo: Alan J. Woods

Ecoregion 20 is an uplifted, eroded, and deeply dissected tableland. Its benches, mesas, buttes, salt valleys, cliffs, and canyons are formed in and underlain by thick layers of sedimentary rock. Juniper-pinyon woodland dominates higher elevations and is far more extensive than in the Wyoming Basin (18). Saltbush-greasewood and blackbrush communities are common at lower elevations but are generally absent from the higher Arizona/New Mexico Plateau (22). Summer moisture from thunderstorms supports warm season grasses not found in the Central Basin and Range (13). Many endemic plants occur and species diversity is greater than in Ecoregion 13. Several national parks are located in this ecoregion and attract many visitors to view their arches, spires, and canyons. Major gas and oil fields are found in the Uinta Basin portion of Ecoregions 20c, 20f, and 20g.

20a The gently sloping **Monticello Upland** is blanketed by eolian material deposited in the lee of the Abajo Mountains. It receives more precipitation in a typical year than the surrounding portions of Ecoregion 20c. Deep, silty Mollisols are characteristic and are able to retain enough available moisture to naturally support Wyoming big sagebrush and associated grasses. These soils now sustain dryland farming for winter wheat and pinto beans. This is the only extensive dryland farming area in the Utah portion of Ecoregion 20. Shallow or stony soils occur along the rims of benches and minor escarpments and support pinyon-juniper woodland.

20b The arid **Shale Deserts** ecoregion consists of nearly level benches, low rounded hills, and badlands. It is sparsely vegetated with mat saltbush, bud sagebrush, galleta and desert trumpet. Soils are mostly Entisols and Aridisols; they are mostly shallow and clayey and contain salts and gypsum. Clayey soils swell when moist and are slowly permeable. Surface runoff and resultant erosion occur during and after rainstorms. Scattered, gravel-capped benches occur and protrude from the present denudational surface because they are much more resistant to erosion than the surrounding shales. Deep, vertical-walled arroyos are carved where surface water concentrates. These arroyos are major contributor of sediment and salt to the Colorado River. Floodplains have alkaline soils that support greasewood, alkali sacaton, seepweed, and shadscale.

20c The **Semiarid Benchlands and Canyonlands** ecoregion is characterized by broad grass-, shrub-, and woodland-covered benches and mesas. Elevations mostly range from 5,000 to 7,500 feet and are higher than those of the Arid Canyonlands (20d). 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. Soils are mostly Entisols. These deep eolian soils are composed of fine sand and support warm season grasses, winterfat, Mormon tea, four-wing saltbush, and sagebrush. Pinyon and juniper occur on shallow, stony soils. Fire suppression and erosion has allowed this woodland to expand beyond its original range. Overall, the vegetation is not as sparse as in drier areas such as Ecoregions 20b, 20d, and 20h.

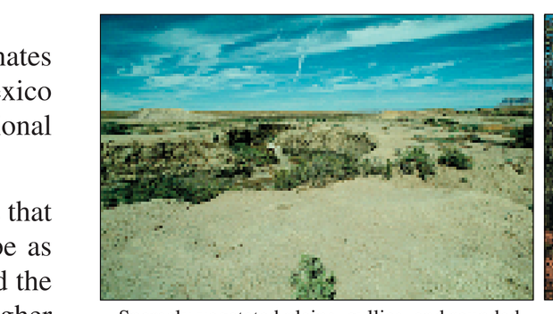
20d The **Arid Canyonlands** ecoregion includes the inner gorge of the Colorado River and its major tributaries. Much of this ecoregion is bounded by nearly vertical, canyon walls that separate it from the adjacent, higher benchlands of Ecoregion 20c. Soils are shallower and have a drier moisture regime than those of Ecoregions 20a and 20c. Exposed bedrock is common. Blackbrush, shadscale, and drought tolerant grasses including galleta and Indian ricegrass occur. Blackbrush is much more common than in Ecoregion 20c where pinyon-juniper woodland and sagebrush dominate. Some cropland and residential development occur near Moab.

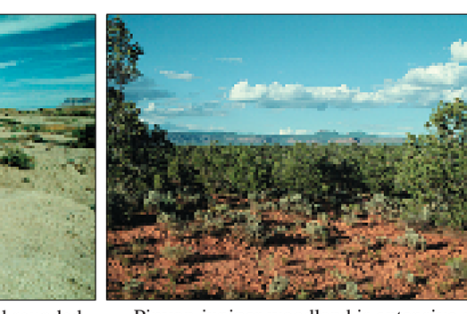
20e The **Escarpments** ecoregion is characterized by extensive, deeply-dissected, cliff-bench complexes that ascend dramatically from Ecoregions 20b or 20c to the forested mountain rim. Local relief can be as great as 3,000 feet. Ecoregion 20e includes major scarp slopes of the Tavaputs Plateau, the Book Cliffs, and the Grand Staircase. Natural vegetation ranges 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.

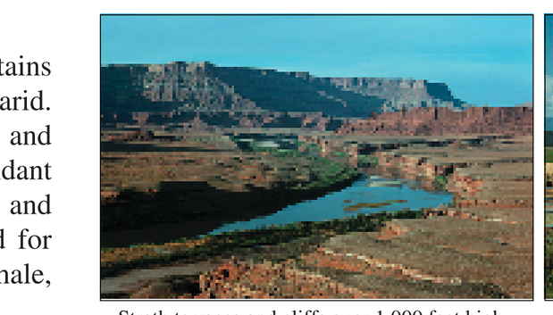
20f The **Uinta Basin Floor** ecoregion lies in a large synclinal basin that is enclosed by the Uinta Mountains and Tavaputs Plateau. Because of its topographic position, precipitation is low and soils are arid. Winters are constantly cold and often foggy due to frigid, dense air draining from the adjacent uplands and resultant air temperature inversions. Ecoregion 20f is distinguished from other arid basins by the abundant stream runoff it receives from the mountains. 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. Excessive irrigation leaches salts from the underlying shale, contributing salinity to the Green River and its tributaries. Non-irrigated areas are used for livestock grazing.

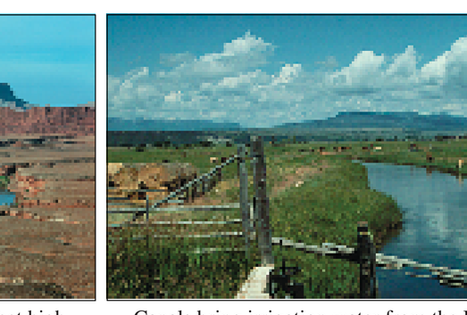
20g The **North Uinta Basin Slopes** ecoregion is a foothill area characterized by numerous mountain-fed streams that are entrenched into benches. It is warmer in winter, cooler in summer, and receives more annual precipitation than the Uinta Basin Floor (20f). Its large number of perennial streams and extensive, stony outwash deposits set it apart from Ecoregion 20c. Pinyon-juniper woodland is common. Mountain brush occurs at higher elevations and riparian vegetation is found along stream courses. Vegetation and climate contrast with the Douglas-fir forests of the higher and wetter Ecoregion 19c. Land use is mostly grazing and irrigated pasture but there is also some irrigated farmland. Major gas and oil fields are located within Ecoregion 20g.

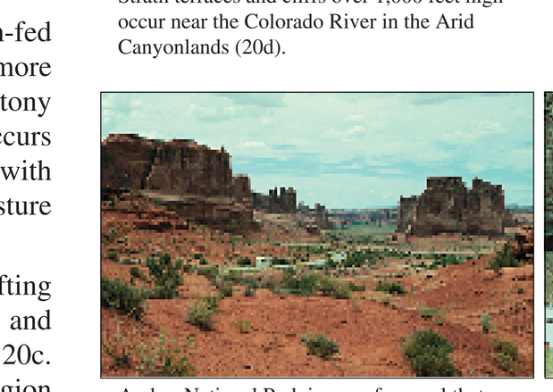
20h The **Sand Deserts** ecoregion is nearly level and contains a mantle of sandy eolian deposits, shifting dunes, and exposed sandstone bedrock. Entisols and Aridisols are common. The soils are sandy and have a low water holding capacity. They have a drier moisture regime than the soils of Ecoregions 20a and 20c. On average, they receive only 5 to 8 inches of precipitation annually. Vegetation is sparser than in Ecoregion 20c and stock carrying capacity is limited. Shifting sand is mostly devoid of vegetation while soils on stable sand blankets support drought-tolerant plants including Indian ricegrass, sand dropseed, yucca, and blackbrush.

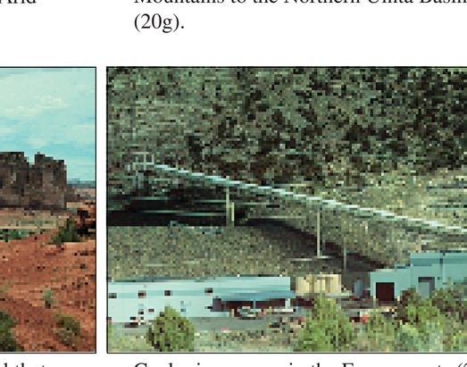

Sparsely vegetated plains, gullies, and rounded low hills occur in the Shale Deserts (20b). The ecoregion has a low stock carrying capacity.


Pinyon-juniper woodland is extensive on the shallow, stony soils of Cedar Mesa in the Semiarid Benchlands and Canyonlands (20c).


Strath terraces and cliffs over 1,000 feet high occur near the Colorado River in the Arid Canyonlands (20d).


Canals bring irrigation water from the Uinta Mountains to the Northern Uinta Basin Slopes (20g).


Arches National Park is one of several that occur in the Colorado Plateaus (20). Each has stunning scenery and attracts many visitors.


Coal mines occur in the Escarpments (20e). This one near Price feeds a neighboring power plant.

21. Southern Rockies


The La Sal Mountains, pictured here, exhibit elevational banding. Above about 11,000 feet elevation, the Alpine Zone (21a) is found and is in the background. Between about 8,800 and 11,000 feet elevation, the Subalpine Forests (21b) ecoregion occurs and is in the foreground.

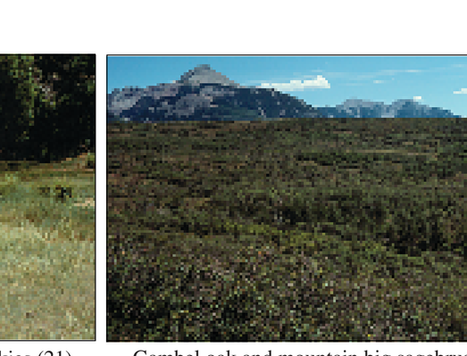
In Utah, Ecoregion 21 is made up of isolated, laccolithic mountains that protrude from the dry expanses of the Colorado Plateaus (20). The La Sal and Abajo mountains are nearer the Rocky Mountains than the Wasatch Range and have faunal affinities with the southern Rockies in Colorado. Vegetation, soils, and land use are elevationally banded. Low to middle elevations are grazed and support Gambel oak, widely-spaced ponderosa pine, and mountain brush. Higher elevations are not as heavily grazed as lower elevations and are largely covered by subalpine fir, Engelmann spruce, Douglas-fir, aspen parkland, and mountain brush. In contrast to Ecoregion 19, lodgepole pine is absent from Ecoregion 21. The highest elevations have alpine characteristics.

21a The glaciated **Alpine Zone** is composed of mountains above timberline, about 11,500 feet elevation. Soils are often stony and shallow. They are mostly Inceptisols and have a cryic temperature regime and an udic moisture regime. Wet meadows, rockland, glacial till, and talus are common and contrast with the dense forests of neighboring, lower ecoregions. Ecoregion 21a receives more precipitation than surrounding portions of the Southern Rockies (21). Runoff from its deep snow pack is a major source of summer water for lower, more arid ecoregions. It is used for recreation and seasonal grazing like the similar but more extensive Alpine Zone (19a).

21b The **Subalpine Forests** ecoregion occupies a narrow elevational band between about 8,800 feet and treeline, about 11,500 feet elevation. Ecoregion 21b is lower in elevation than the Alpine Zone (21a) and higher than the Dry Forests and Shrublands (21c). It is dominated by tree species that thrive in cool, humid climates with heavy snow cover, such as subalpine fir and Engelmann spruce. The potential natural vegetation is mapped as southwestern spruce-fir and pine-Douglas-fir forest and is distinct from that of lower and higher ecoregions. Soils are mostly Mollisols and Inceptisols and have a cryic temperature regime and an udic moisture regime. Land uses include logging, mining, seasonal grazing, and recreation.

21c The **Dry Forests and Shrublands** ecoregion includes lower mountain slopes between about 7,500 and 9,000 feet elevation. Vegetation, includes Douglas-fir, ponderosa pine, Gambel oak, and an understory of mountain brush; it is distinct from the subalpine forests of the higher, wetter Ecoregion 21b and the juniper-pinyon woodland of Ecoregion 20c. Soils are mostly Mollisols and have a frigid temperature regime and an ustic moisture regime. Land use includes livestock grazing, mineral extraction, and recreation. Perennial streams are diverted for irrigation and can be dry in their lower reaches in the summer.


Elk are common in the Southern Rockies (21). They are found on high mountain pastures during the summer and on densely forested lower slopes during the winter.


Gambel oak and mountain big sagebrush grow on the lower parts of the La Sal Mountains in Ecoregion 21c. In the background, Ecoregion 21a occurs above treeline.

80. Northern Basin and Range


Bunchgrass and sagebrush dominate the valleys, alluvial fans, and mountain flanks of the Northern Basin and Range (80). Much of the region is used as rangeland. Scattered junipers are found amid bunchgrasses and sagebrush in higher, more rocky locations.

Ecoregion 80 consists of dissected lava plains, rolling hills, alluvial fans, valleys, and scattered mountains. Although arid, it is higher and cooler than Ecoregion 12 and has more available moisture than Ecoregion 13. Non-mountain areas have sagebrush steppe vegetation; cool season grasses and Mollisols are more common than in the hotter-drier basins of Ecoregion 13 where Aridisols support sagebrush, shadscale, and greasewood. Ranges are covered in mountain sagebrush, mountain brush, Idaho fescue, Douglas-fir, subalpine forests, or aspen. Juniper woodlands occur on rugged, stony uplands. Rangeland is common but dryland and irrigated cropland are found locally. Ecoregion 80 is found in the northernmost part of Utah beyond the extent of Pleistocene Lake Bonneville. The Raft River Mountains contain mammal and plant species that are typical of the Columbia Plateau but absent from the rest of Utah.

80a The **Dissected High Lava Plateau** ecoregion consists of alluvial fans, rolling plains, and hills. It is more arid than Ecoregion 80i and is lower in elevation, less rocky, and much less rugged than Ecoregions 80b and 80c. The potential natural vegetation is mostly sagebrush steppe but scattered woodlands are found on rocky and gravelly uplands. Wyoming big sagebrush, black sagebrush, bluebunch wheatgrass, and Idaho fescue are abundant; bunchgrasses are more common than in Ecoregion 80b. Overall, Ecoregion 80a is less wooded than Ecoregions 80b and 80c and lacks the saltbush-greasewood of Ecoregions 13b and 80h. Mollisols are common and are distinct from the Aridisols of Ecoregions 13b and 13c. Most soils have a frigid temperature regime and are colder than the mesic soils of Ecoregion 13c but warmer than the cryic soils of Ecoregion 80c. Land use is primarily rangeland and wildlife habitat but some irrigated pastureland and cropland also occur.

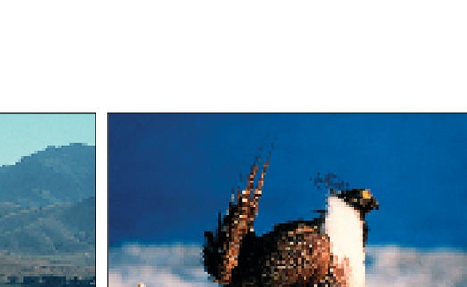
80b The **Semiarid Hills and Low Mountains** ecoregion is composed of mountain slopes, hills, and alluvial fans. It occupies the elevational belt between the High Elevation Forests and Shrublands (80c) and the lower, less rugged Dissected High Lava Plateau (80a) and **Sagebrush Steppe Valleys** (80i). Ecoregion 80b includes shrublands and woodlands but lacks the forest components of the wetter Ecoregion 80c. Cool season grasses are more common and there is more available moisture than in Ecoregion 13c. Pinyon is near its distributional limit in northern Utah and is much rarer than in Ecoregion 13d to the south.

80c The **High Elevation Forests and Shrublands** ecoregion is composed of steep, rugged mountains that have cold winters. Douglas-fir, aspen, and stands of subalpine conifers occur in isolated pockets within a matrix of black sagebrush or mountain sagebrush. Open grassland grows on wide ridge tops. The climate and vegetation mosaics of Ecoregion 80c are unlike those of nearby lower and drier Ecoregions 80a and 80b that are dominated by sagebrush steppe, shrublands, or juniper woodlands. Soils have a cryic temperature regime and are colder than the frigid and mesic soils of Ecoregion 80a. Mollisols are widespread and are unlike the Aridisols that are common in Ecoregions 13b and 13c.

80h The arid **Saltbush-Dominated Valleys** ecoregion is externally-drained and composed of gently sloping valley bottoms that are dominated by salt tolerant vegetation including shadscale, winterfat, and greasewood. The potential natural vegetation is distinct from the Great Basin sagebrush of Ecoregion 13c and the sagebrush steppe of Ecoregions 80a and 80i. Light-colored soils with high salt and alkali content are common; they are dry for extended periods. Land use is primarily rangeland and irrigated agriculture. Irrigated farming is more common than in the internally-drained Shadscale-Dominated Saline Basins (13b).

80i The **Sagebrush Steppe Valleys** ecoregion consists of gently sloping, unforested terraces, basin rims, valley bottoms, and alluvial fans that are not as arid as Ecoregions 13a, 13b, 13c and 80a. Ecoregion 80i is less saline than Ecoregions 13a, 13b, and 80h and is lower in elevation, less rocky, and less rugged than Ecoregions 13d, 80b, and 80c. The potential natural vegetation is sagebrush steppe and contrasts with the Great Basin sagebrush of Ecoregion 13c and the saltbush-greasewood of Ecoregions 13b and 80h. Cool season grasses are more common than in Ecoregion 13c and nonirrigated cropland is common.


Mountain-fed perennial streams and canals provide water to irrigate cropland and pastures in the Lower Bear Valley of Ecoregion 80i.
Photo: Ron Nichols (NRCS)


Sage grouse occur amid the sagebrush of the Northern Basin and Range (80). They winter on the plains and summer in the foothills.
Photo: Ron Stewart