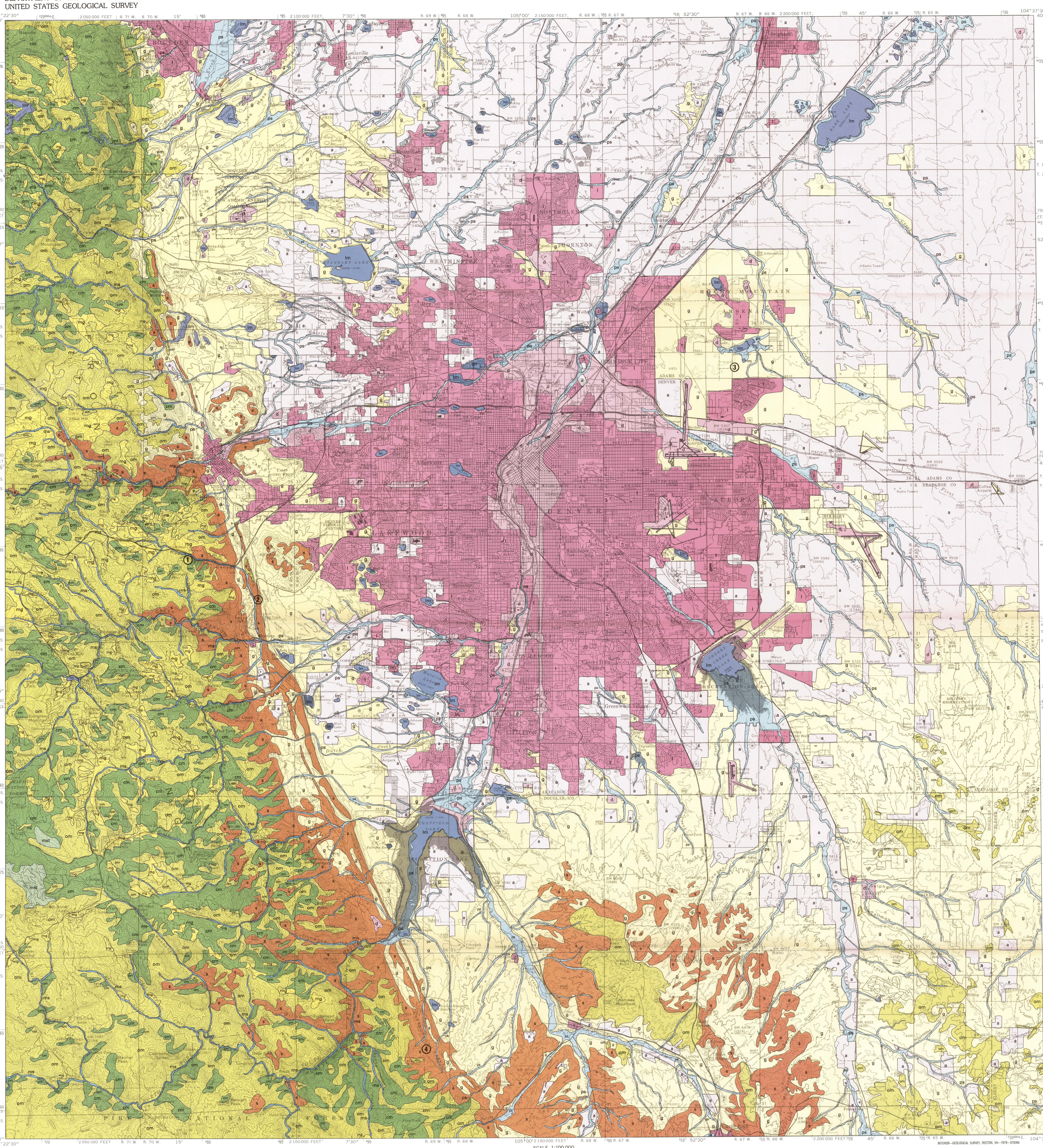
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I–856–I



Base compiled by U.S. Geological Survey in 1972 from 1:24,000 quadrangles dated 1965–1966. Limited revision from aerial photographs taken in 1971
50,000-foot grid based on Colorado coordinate system, central zone
5000-meter Universal Transverse Mercator grid, zone 13

SCALE 1:100 000

1 0 1 2 3 4 5 6 7 8 9 10 MILES

1 0 1 2 3 4 5 6 7 8 9 10 KILOMETERS

CONTOUR INTERVAL 100 FEET
DOTTED LINES REPRESENT 50-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA—1979—G78366

Vegetation mapped in 1976

VEGETATION MAP OF THE GREATER DENVER AREA, FRONT RANGE URBAN CORRIDOR, COLORADO

By
John W. Marr and William S. Boyd

1979

EXPLANATION

REGIONAL ECOSYSTEMS

Grassland

- g — Plains grassland
- mg — Mountain grassland
- s — Submontane shrubland

Montane forest

- om — Open montane forest
- cm — Closed montane forest
- mst — Montane-subalpine transition zone

Streamside shrubland and forest

- ps — Plains streamside
- ms — Mountain streamside
- lm — Lakes and marshes

CULTURAL ECOSYSTEMS

- d — Disturbed land
- l — Landscaped vegetation
- a — Agricultural land

(2) FEATURE OF SPECIAL INTEREST—Described in text

INTRODUCTION

Vegetation is one of our most valuable renewable resources; it is the primary producer of organic matter on which all nongreen organisms are dependent for energy, construction materials, aesthetic enjoyment, and other necessities of life. In order to secure the greatest possible returns from the utilization of the different types of vegetation, people need to know what species are present, the ecological processes in which they are involved, and the ways in which they are arranged in the landscape. This vegetation map is designed to help persons in a wide variety of activities to secure that information.

Vegetation does not occur as self-sufficient units separate from the rest of the world; rather each unit of vegetation is a subsystem of a larger ecological unit which includes both organisms and environment and is known as an *ecosystem*. The interactions of an ecosystem's organisms and environment, both current and in the past, determine its characteristics and its geographical distribution. Transitions from one ecosystem to another may occur abruptly or across a broad belt. The most extensive of the earth's ecosystems is the biosphere, that thin hospitable layer of land, air, and water that supports life. The characteristics of the biosphere vary from place to place due to differences in available organisms, current environment, and historical events. Each relatively homogeneous subdivision of the biosphere is a *regional ecosystem*, a landscape unit whose boundaries and dominant plant form are determined by regional climate. The evergreen, needle-leaved trees of the mountain forests and the herbs of the plains grassland are examples of dominant plant forms in two regional ecosystems.

Within each region, local ecosystems or *stands* are produced by variations in soil factors, land-use history, moisture availability, the angle of exposure to the sun, and angle of slope of the ground surface. For example, a cottonwood stand within a plains grassland regional ecosystem indicates local soil moisture well above average for the region.

Stand ecosystems are dynamic entities. If the stand has a moderate environment, its internal processes may be so well balanced that it is *persistent* as long as there is no catastrophe or change in climate. In contrast, if a stand has a local environment that is extreme for the region, it is *transitory* and has a tendency to change to a more moderate type if conditions ameliorate.

If a stand ecosystem is modified by some event which results in signifigant change in its organisms or environment, the resulting new stand is usually a transitory type, and it will have an inherent tendency to change toward a persistent type.

Vegetation is often the most visible characteristic of a stand ecosystem. Therefore, vegetation can indicate numerous characteristics of an area such as its land-use history, water availability, soil conditions, and slope stability. For example, a mature stand of bristlecone pine indicates a windy environment, coarse soil, and possibly great age of the stand. In contrast, a vigorous, mature aspen stand indicates moist soil and a relatively young stand age. The land-user will benefit from the knowledge that an aspen stand can be transitory while the bristlecone pine stand has the potential of being persistent. We have listed a group of these "indicator" plants for each of the map units. We selected these species on the basis of our field surveys and previous experience. The species which dominate the various transitory stands are indicated by an asterisk; a dagger indicates species which would be expected to dominate persistent stands.

While some ecosystems are essentially free from human influence, others such as landscaped, agricultural, and disturbed land, exist only under human management or intervention. These are *cultural* ecosystems.

The terminology and concepts described above provide a basis for the following condensed description of the Front Range Urban Corridor:

The plains grassland and the montane coniferous forest are the two major regional ecosystems in the Front Range Urban Corridor. The grassland region extends to elevations of 6,000 ft (1,830 m) and is a mosaic of grass stands plus stands dominated by cottonwood trees along rivers, shrubs in ravines, and scattered ponderosa pine and juniper trees on rocky breaks where highlands descend to river terraces. People use the grassland today chiefly for cultivation, grazing, and urban establishment. In many areas their activities have converted the native perennial bunch-grass vegetation to fields of annual weeds.

The foothills of the Front Range support stands of ponderosa pine and Douglas-fir. At low elevations of 6,000 to 7,700 ft, adjacent to the plains, the vegetation region is called the lower montane forest and is composed chiefly of open stands of ponderosa pine. At higher elevations, the density of the forest in moderate sites increases, and Douglas-fir becomes more abundant. This forest, which is generally found from 8,000–9,000 ft (2,400–3,000 m), is called the upper montane forest. For the sake of clarity, lower and upper montane forests are referred to on this map as "montane forest." Instead, montane forests are subdivided on the basis of canopy type. In the *closed* canopy type, contact of crowns is common. Trees in open canopy forests are widely spaced. Differences in tree density often result in differences in understory vegetation. In the open canopy forest there is a mosaic of grass and shrub patches among the trees, whereas there is only a sparse scattering of herbs in the closed canopy forest.

The effects of people on the vegetation of the Urban Corridor became intensive in the mid–1800's when a population increase was generated by the lure of livestock ranching, gold in the mountains, and coal and oil on the plains. By the 1880's, irrigation had become a powerful tool for modifying the native vegetation, and population centers became concentrated along the east slope of the Front Range.

Persisting vegetation types are rare in urban and suburban areas, since human activity tends to generate transitory units that last only as long as they are cared for. These "cultural" ecosystems provide the environment where most people spend most of their time. Because people now seek to alter ecosystems over which they previously held little influence, it is important for them to understand the processes which direct those ecosystems as well as the results of those processes.

MAP PREPARATION

This map is based primarily on high-altitude color infrared photography taken during the following NASA flights: 120 on February 6, 1970, 186 on October 21, 1971, and ERAP 72–188 on October 26, 1972. All of the map units were visited in the field to confirm interpretation of the photographs.

Owing to the small scale of this map, boundary lines shown on the map can only approximate actual boundaries on the ground, and certain small areas of vegetation have been omitted. The minimum unit shown is a circle 554 m in diameter on the ground which is represented by a circle 6.4 mm in diameter on the map. The accuracy of each boundary line is limited by the fact that a line 0.51 mm wide represents a width of 51 m on the ground. Consequently, the width of narrow map units, such as streamside shrubland and forest, may have been exaggerated. Errors in the imagery and in the transferral of data from the imagery to the map can result in the misplacement of any line by as much as 1.5 mm (150 m on the ground).

REGIONAL ECOSYSTEMS

GRASSLANDS

The grasslands category contains two subdivisions, the plains type and the mountain type. These are similar in general appearance but differ in species composition. Trees and shrubs occur in both subdivisions along streams and in moist basins and ravines, but they cover less than 20 percent of the landscape.

Most plains grassland stands have been modified by grazing; occasional natural stands in fence areas are associated with roads, railroads, cemeteries, and government property.

In the mountains, relatively persistent grasslands form extensive stands on coarse, well-drained soils and smaller patches in forest clearings. Transitory grasslands have developed where the forest has been cleared for cultivation or pasture.

In the following species lists, an asterisk indicates a species that is conspicuous in the current vegetation; species that would probably become conspicuous if there were no disturbances are indicated by a dagger.

PLAINS GRASSLANDS

Common name	Species name
TREES	
Cottonwood, plains	*Populus sargentii*
Hackberry	*Celtis reticulata*
Juniper, Rocky Mountain	*Juniperus scopulorum*
Pine, ponderosa	*Pinus ponderosa*
Willow, peach-leaved	*Salix amygdaloides*
SHRUBS	
Eriogonum bushy	*Eriogonum effusum*
*Prickly-pear	*Opuntia polyacantha*
*Rabbitbrush	*Chrysothamnus nauseosus*
†*Skunkbrush	*Rhus trilobata*
*Yucca	*Yucca glauca*
HERBS	
Aster	*Aster falcatus*
Aster, golden	*Heterotheca villosa*
Bergamot, pink	*Monarda fistulosa*
†*Blanket-flower	*Gaillardia aristata*
*Blue-grass, Canada	*Poa compressa*
†Bluestem, big	*Andropogon gerardii*
†Bluestem, little	*Schizochyrium scoparium*
†Buffalo-grass	*Buchloe dactyloides*
*Cheatgrass	*Bromus tectorum*
†*Coneflower, prairie	*Ratibida columnifera*
Copper mallow	*Sphaeralcea coccinea*
Daisy, Easter	*Townsendia hookeri*
*Dropseed, sand	*Sporobolus cryptandrus*
†*Grama, blue	*Bouteloua gracilis*
†Grama, side-oats	*Bouteloua curtipendula*
†Indian ricegrass	*Oryzopsis hymenoides*
†*June-grass	*Koeleria macrantha*
Lupine, common	*Lupinus plattensis*
Loco, Colorado	*Oxytropis lambertii*
*Muhly, ring	*Muhlenbergia torreyi*
Mustard, Jim Hill	*Sisymbrium altissimum*
Mustard, tansy	*Descurainia richardsonii*
†*Needle-and-thread	*Stipa comata*
Penstemon, narrow-leaved	*Penstemon angustifolius*
Primrose, white stemless evening	*Oenothera caespitosa*
*Sagebrush, pasture	*Artemisia frigida*
Spiderwort	*Tradescantia occidentalis*
*Sunflower, common	*Helianthus annuus*
*Three-awn, red	*Aristida longiseta*
†*Wheat-grass, slender	*Agropyron trachycaulum*
*Wheat-grass, western	*Agropyron smithii*
Wild-rye, Canada	*Elymus canadensis*
Wormwood, linear-leaved	*Artemisia dracunculus*

MOUNTAIN GRASSLANDS

Common name	Species name
TREES	
Douglas-fir	*Pseudotsuga menziesii*
Juniper, Rocky Mountain	*Juniperus scopulorum*
Pine, ponderosa	*Pinus ponderosa*
SHRUBS	
†*Mountain-mahogany	*Cercocarpus montanus*
Prickly-pear	*Opuntia polyacantha*
†*Skunkbrush	*Rhus trilobata*
Snowberry	*Symphoricarpos occidentalis*
Yucca	*Yucca glauca*
HERBS	
Aster, Porters	*Aster porteri*
Black-eyed susan	*Rudbeckia hirta*
†Blue-grass	*Poa agassizensis*
†*Bluestem, little	*Schizochyrium scoparium*
Daisy, Easter	*Townsendia grandiflora*
Fleabane	*Erigeron spp.*
Golden banner	*Thermopsis divaricarpa*
†*Grama, blue	*Bouteloua gracilis*
Harebell, common	*Campanula rotundifolia*
†*June-grass	*Koeleria macrantha*
†Muhly, mountain	*Muhlenbergia montana*
†*Needle-and-thread	*Stipa comata*
Onion, wild	*Allium geyeri*
†*Pasque-flower	*Pulsatilla patens*
†*Pussytoes	*Antennaria rosea*
Ragwort, golden	*Senecio spp.*
*Sage, prairie	*Artemisia ludoviciana*
*Sagebrush	*Artemisia frigida*
Scorpion-weed	*Phacelia heterophylla*
Sego-lily	*Calochortus gunnisonii*
†Selaginella, rock	*Selaginella densa*
†Stonecrop, yellow	*Sedum lanceolatum*
†*Sulfur-flower	*Eriogonum umbellatum*
Three-awn, fendler	*Aristida fendleriana*
*Timothy	*Phleum pratense*
Wild flax	*Linum lewisii*
Wild-rye, Canada	*Elymus canadensis*
*Yarrow	*Achillea lanulosa*

*Dominates transitory stands
†Dominates persistent stands

SUBMONTANE SHRUBLAND

A shrub-dominated regional ecosystem occurs between the plains grassland and the coniferous forest. This extensive region includes river bluffs and mesas and is broken into a variety of stand ecosystems by variations in soil moisture.

The most common stand type is dominated by Gambel oak which reaches its northern limit on the lowest hogback west of Denver (see Special interest features).

Throughout the submontane shrubland, dry hillside stands are dominated by mountain-mahogany, accompanied by skunkbrush, rabbitbrush, and yucca. In ravines and gullies, chokecherry, snowberry, and hawthorn stands are common. Skunkbrush dominates stands of intermediate moisture conditions, and it is more successful than mountain-mahogany in competition with grass on deep soil.

Common name	Species name
TREES	
Douglas-fir	*Pseudotsuga menziesii*
Juniper, Rocky Mountain	*Juniperus scopulorum*
Pine, ponderosa	*Pinus ponderosa*
SHRUBS	
Chokecherry	*Prunus virginiana*
Currant, squaw	*Ribes cereum*
Eriogonum, bushy	*Eriogonum effusum*
Hawthorn	*Crategus spp.*
†*Mountain-mahogany	*Cercocarpus montanus*
†*Oak, Gambel	*Quercus gambelii*
†*Poison ivy	*Toxicodendron rydbergii*
Rabbitbrush	*Chrysothamnus nauseosus*
†*Skunkbrush	*Rhus trilobata*
†*Snowberry	*Symphoricarpos occidentalis*
*Yucca	*Yucca glauca*
HERBS	
*Aster, golden	*Heterotheca villosa*
Bergamot, pink	*Monarda fistulosa*
†*Blazing star	*Liatris punctata*
Death camas	*Zygadenus venenosus*
†*Geranium, common wild	*Geranium caespitosum*
†Gilia, scarlet	*Ipomopsis aggregata*
†*Gilia, spike	*Ipomopsis spicata*
Grama, side-oats	*Bouteloua curtipendula*
June-grass	*Koeleria macrantha*
†Larkspur	*Delphinium nelsonii*
*Needle-and-thread	*Stipa comata*
†*Penstemon, one-sided	*Penstemon secundiflorus*
Primrose, white stemless evening	*Oenothera caespitosa*
†*Pussytoes	*Antennaria rosea*
†*Sand-lily	*Leucocrinum montanum*
Skullcap	*Scutelaria brittonii*
Spiderwort	*Tradescantia occidentalis*
†*Sulfur-flower	*Eriogonum umbellatum*
*Sunflower	*Helianthus annuus*
Wild flax	*Linum lewisii*
*Yarrow	*Achillea lanulosa*

*Dominates transitory stands
†Dominates persistent stands

MONTANE FOREST

Forest dominated by evergreen, needle-leaved trees occupies a belt at intermediate elevations on the east slopes of the mountains. This "montane forest" lies between the woodlands of lower elevations, and the dense forest of more slender, spire-shaped trees which form the dark-colored band of "subalpine forest" just below the upper limits of tree growth. Douglas-fir is the dominant tree species in this montane forest unit. However, south- and east-facing slopes below elevations of 8,200 ft (2500 m) are commonly dominated by ponderosa pine. There are also some stands in which the dominants are juniper, lodgepole pine, limber pine, and aspen.

The density of the shrub and herb understory is inversely related to the density of the tree crowns because, as the canopy cover decreases, the cover of shrubs and herbs increases. Mountain-mahogany and skunkbrush are common in open forest, and squaw currant is the most common shrub under ponderosa pine. Kinnikinnik and waxflower are common in Douglas-fir stands.

There is considerable variation in the density of the vegetation in the montane forest although the list of plant species is rather constant from one stand to the next. In order to achieve more homogeneous map units, we subdivided this unit on the basis of the percentage of the ground shaded by tree crowns. Those stands with trees covering less than 65 percent of the ground were placed in the "open montane forest" unit while those stands with density of crowns exceeding 65 percent were included in the "closed montane forest" unit.

OPEN MONTANE FOREST

Common name	Species name
TREES	
†*Douglas-fir	*Pseudotsuga menziesii*
†*Juniper, Rocky Mountain	*Juniperus scopulorum*
†*Pine, ponderosa	*Pinus ponderosa*
SHRUBS	
Chokecherry	*Prunus virginiana*
†*Currant, squaw	*Ribes cereum*
†*Juniper, common	*Juniperus communis*
†*Kinnikinnik	*Arctostaphylos uva-ursi*
Mountain-mahogany	*Cercocarpus montanus*
Oceanspray	*Holodiscus dumosus*
†*Oregon-grape	*Mahonia repens*
*Rose, wild	*Rosa woodsii*
*Skunkbrush	*Rhus trilobata*
Snowberry	*Symphoricarpos oreophilus*
HERBS	
Aster	*Aster spp.*
Beard-tongue	*Penstemon spp.*
†*Blazing-star	*Liatris punctata*
†Caraway, mountain	*Aletes acaulis*
Cinquefoil, soft	*Drymocallis fissa*
Fleabane	*Erigeron spp.*
Geranium, common wild	*Geranium caespitosum*
Goldenrod	*Solidago spp.*
†*Golden banner	*Thermopsis divaricarpa*
†*Grama, blue	*Bouteloua gracilis*
†*June-grass	*Koeleria macrantha*
Loco, Colorado	*Oxytropis lambertii*
†Muhly, mountain	*Muhlenbergia montana*
Needle-and-thread	*Stipa comata*
Paintbrush	*Castilleja linariaefolia*
Parsley, whisk-broom	*Harbouria trachypleura*
†*Pasque-flower	*Pulsatilla patens*
†*Ragwort, golden	*Senecio spp.*
†*Sagebrush, pasture	*Artemisia frigida*
†*Stonecrop, yellow	*Sedum lanceolatum*
*Sulfur-flower	*Eriogonum umbellatum*
*Yarrow	*Achillea lanulosa*

CLOSED MONTANE FOREST

Common name	Species name
TREES	
Aspen	*Populus tremuloides*
†*Douglas-fir	*Pseudotsuga menziesii*
†Pine, limber	*Pinus flexilis*
*Pine, lodgepole	*Pinus contorta*
†*Pine, ponderosa	*Pinus ponderosa*
Spruce, Engelmann	*Picea engelmannii*
SHRUBS	
Honeysuckle	*Lonicera involucrata*
†Juniper, common	*Juniperus communis*
Maple, Rocky Mountain	*Acer glabrum*
Raspberry	*Rubus idaeus*
Rose, wild	*Rosa woodsii*
†Waxflower	*Jamesia americana*
HERBS	
Beard-tongue	*Penstemon spp.*
†*Blueberry, myrtle	*Vactinium myrtillus*
Cinquefoil	*Potentilla diversifolia*
Fairy slipper	*Calypso bulbosa*
†*Strawberry	*Fragaria ovalis*
Violet, mountain blue	*Viola adunca*
†*Wintergreen, one-sided	*Ramischia secunda*

*Dominates transitory stands
†Dominates persistent stands

MONTANE-SUBALPINE TRANSITION ZONE

The montane forest is replaced by subalpine forest at approximately 8,800 ft (2700 m) across a broad "altitudinal belt." In this region, which occupies the highest elevation in the map area, mixtures of aspen, Douglas-fir, lodgepole pine, limber pine, and Engelmann spruce form transitory stands after disturbances caused by fire, logging, mining, and other human activities. In the absence of renewed disturbance, these transitory stands may revert eventually to a predominance of Douglas-fir at lower elevations or Engelmann spruce at higher elevations.

Common name	Species name
TREES	
*Aspen	*Populus tremuloides*
Pine, limber	*Pinus flexilis*
Pine, lodgepole	*Pinus contorta*
†*Spruce, Engelmann	*Picea engelmannii*
SHRUBS	
†*Blueberry, myrtle	*Vaccinium myrtillus*
Cinquefoil, shrubby	*Pentaphylloides floribunda*
Juniper, common	*Juniperus communis*
HERBS	
†Arnica, heart-leaved	*Arnica cordifolia*
Cinquefoil	*Drymocallis fissa*
Fireweed	*Chamerion angustifolium*
Golden banner	*Thermopsis divaricarpa*
Lupine, common	*Lupinus argenteus*
Paintbrush, scarlet	*Castilleja miniata*
Pussytoes	*Antennaria rosea*
Stonecrop	*Sedum lanceolatum*
†*Violet, mountain blue	*Viola adunca*
*Yarrow	*Achillea lanulosa*

*Dominates transitory stands
†Dominates persistent stands

STREAMSIDE SHRUBLAND AND FOREST

Streamside vegetation encompasses a wide range of types requiring continuously high soil-moisture conditions. It is similar on the plains and in the foothills, but species composition differs. Along the rivers and streams of the plains, the broad-leaf cottonwood dominates, and willow, Box-elder, hackberry, and hawthorn are common. In the mountains, narrow-leaf cottonwood, alder, Colorado blue spruce, and aspen are common. Foothills and mountain streamside communities are smaller than those of the plains because appropriate habitats are less extensive.

PLAINS, STREAMSIDE SHRUBLAND AND FOREST

Common name	Species name
TREES	
†*Box-elder	*Acer negundo*
†*Cottonwood, broad-leaf	*Populus sargentii*
Russian-olive	*Eleagnus angustifolia*
SHRUBS	
Hackberry, net-leaved	*Celtis reticulata*
†*Hawthorn	*Crategus spp.*
Maple, Rocky Mountain	*Acer glabrum*
†*Willow	*Salix spp.*
HERBS	
†*Barley, foxtail	*Hordeum jubatum*
Barnyard grass	*Echinochloa crus-galli*
Carrizo	*Phragmites communis*
†*Cattail, broad-leaved	*Typha latifolia*
†*Horsetail, field	*Equisetum arvense*
*Milkweed	*Asclepias speciosa*
*Orchard-grass	*Dactylis glomerata*
†Rush, Torreys	*Juncus torreyi*
†*Scouring-rush	*Equisetum hyemale*
†*Sedge	*Carex spp.*
†Spike-rush	*Eleocharis macrostachya*
Stinging-nettle	*Urtica dioica*
†Three-square	*Scirpus americanus*
Watercress	*Nasturtium officinale*
*Waterleaf	*Hydrophyllum fendleri*

MOUNTAIN STREAMSIDE SHRUBLAND AND FOREST

Common name	Species name
TREES	
Aspen	*Populus tremuloides*
†*Cottonwood, narrow-leaf	*Populus angustifolius*
†*Spruce, Colorado blue	*Picea pungens*
SHRUBS	
†*Alder, thin-leaved	*Alnus tenuifolia*
†*Birch, river	*Betula fontinalis*
†Dogwood, redosier	*Swida sericea*
†Hazelnut, beaked	*Corylus cornuta*
†Maple, Rocky Mountain	*Acer glabrum*
†*Willow	*Salix spp.*
HERBS	
Goosegrass	*Galium aparine*
†*Horsetail, field	*Equisetum arvense*
†*Rush	*Juncus arcticus*
†*Scouring-rush	*Equisetum hyemale*
†*Sedge	*Carex spp.*
†*Spike-rush	*Eleocharis macrostachya*
Stinging-nettle	*Urtica dioica*
Watercress	*Nasturtium officinale*
Waterleaf	*Hydrophyllum fendleri*
Violet, mountain blue	*Viola adunca*
Virgin's bower, western	*Clematis ligusticifolia*

*Dominates transitory stands
†Dominates persistent stands

LAKES AND MARSHES

Lakes and marshes provide habitats for plants with high-moisture requirements that would otherwise be unable to survive in the dry climate of this region. These plants include submerged and floating aquatics such as pondweed, duckweed, watermilfoil, and water-crowfoot, and emergents such as cattail, three-square, bulrush, marestail, and Carrizo. Trees and shrubs of the willow family are common on the borders of streams, ponds, and lakes.

Common name	Species name
TREES	
†*Box-elder	*Acer negundo*
†*Cottonwood, plains	*Populus sargentii*
SHRUBS	
†*Tamarisk	*Tamarix pentandra*
†*Willow	*Salix spp.*
HERBS	
Arrowhead	*Sagitaria latifolia*
Beggarticks	*Bidens frondosa*
†*Carrizo (or common reed)	*Phragmites communis*
Cocklebur	*Xanthium strumarium*
†Crowfoot, water	*Ranunculus aquatilis*
Cucumber, mock	*Echinocystis lobata*
Hedge-hyssop	*Gratiola neglecta*
Meadowrue, purple	*Thalictrum dasycarpum*
*Poison-hemlock	*Conium maculatum*
†Pondweed	*Potamogeton spp.*
†Rush	*Juncus spp.*
†Sedge	*Carex spp.*
Smartweed	*Persicaria pensylvanica*
†Spike-rush	*Eleocharis macrostachya*
Stinging-nettle	*Urtica dioica*
*Water-hemlock	*Cicuta douglasii*
†*Watermilfoil	*Myriophyllum spicatum*
Waterplantain	*Alisma plantago-aquatica*
†Willow-herb, northern	*Epilobium glandulosum*

*Dominates transitory stands
†Dominates persistent stands

CULTURAL ECOSYSTEMS

Cultural ecosystems occur where human activities have modified the vegetation and environment to various degrees. The resulting systems are generally stable units which persist as long as people dominate them. Three types of ecosystems are produced by human activities-disturbed, landscaped, and agricultural lands.

DISTURBED LAND

The disturbed vegetation unit refers to areas in which native plant cover has been drastically reduced or completely removed through human activity. In some rural areas, these activities have denuded the vegetation but left the soils intact. If disturbance activities cease, these areas may revegetate with weedy species that may eventually be replaced by other species to form a persistent stand. Quarries, gravel pits, areas surrounding heavy construction, and areas of heavy off-road vehicle use are examples of rural disturbed areas.

Urban disturbed areas have little or no soil, and consequently vegetation is sparse or entirely lacking. City buildings, industrial complexes, parking lots, and airport runways are examples of urban disturbance.

Common name	Species name
TREES	
Elm, Chinese	*Ulmus parvifolius*
Locust	*Robinia pseudo-acacia*
HERBS	
Alyssum	*Alyssum alyssoides*
Burdock	*Arctium minus*
*Burning-bush	*Kochia iranica*
Carduus	*Carduus nutans ssp. macrolepis*
*Cheatgrass	*Bromus tectorum*
Cheeseweed	*Malva neglecta*
*Cocklebur	*Xanthium strumarium*
*Devils-shoestring	*Polygonum aviculare*
Dock, curly	*Rumex crispus*
Fescue, six-weeks	*Vulpia octoflora*
Filaree	*Erodium cicutarium*
Flax, false	*Camelina microcarpa*
*Gumweed	*Grindelia squarrosa*
Knapweed	*Centaurea diffusa*
Lambsquarters	*Chenopodium album*
*Lettuce, prickly	*Lactuca serriola*
*Mullein	*Verbascum thapsus*
Mustard, tansy	*Descurainia richardsonii*
*Pigweed, rough	*Amaranthus retroflexus*
*Plaintain, wooly	*Plantago patagonica*
Poison-hemlock	*Conium maculatum*
*Ragweed, western	*Ambrosia psilostachya*
*Salsify	*Tragopogon dubius*
*Squirrel-tail	*Sitanion longifolium*
Stickweed	*Lappula redowskii*
Sunflower, common	*Helianthus annuus*
*Thistle, Canada	*Cirsium arvense*
*Thistle, Russian	*Salsola iberica*
Timothy	*Phleum pratense*

*Dominates transitory stands

LANDSCAPED VEGETATION

Landscaped vegetation exists only under the care of people. The species of this type are not native, and the environment they occupy has been modified by the importation or development of nonnative soils, the regular addition of soil nutrients, and the supplementation of moisture. Species used in landscaping are often incapable of reproduction without help from people, and they are poor competitors when invaded by native species. Because of the large number of species encountered, there is no species list for this type.

AGRICULTURAL LAND

Agricultural land encompasses irrigated and dryland farmed areas of the plains and foothills, as well as truck and sod farms along major river systems. Cultivated land includes fallow land but excludes uncultivated grasslands used for pasture.

Common name	Species name
IRRIGATED FARMING	
*Corn	*Zea mays*
*Wheat	*Triticum aestivum*
DRYLAND FARMING	
*Wheat	*Triticum aestivum*
SOD FARMING	
*Kentucky blue-grass	*Poa pratensis*
TRUCK FARMING	
Beans	*Phaseolus spp.*
Beets	*Beta vulgaris*
Cabbage	*Brassica oleracea*
Cauliflower	*Brassica sp.*
Carrot	*Daucus carota*
Celery	*Apium graveolens*
Lettuce	*Lactuca sativa*
Onion	*Allium cepa*
Pumpkin and squash	*Cucurbita spp.*
Radish	*Raphanus sativus*
Rhubarb	*Rheum rhaponticum*
Spinach	*Spinacia oleracea*
Tomato	*Lycopersicon esculentum*
Turnip	*Brassica spp.*

*Dominates transitory stands

FEATURES OF SPECIAL INTEREST

Each plant species has a tendency to spread its geographic area to the limits of the regional environment to which it is adapted by its combination of genes. When the limits under a particular climate have been reached, the general geographic limits of a species will be fixed until there is some change in the environment. When such an environmental change occurs, and they are frequent in terms of geologic time, the species' geographic area will move in order to adjust to the new environmental pattern. During this adaptational process, populations may be "left behind" in small areas of special environment. The resulting stand ecosystems are often delicate because the plants are existing in environments near the margin of their tolerance. Small modifications, by people, for example, can result in extermination of the entire population. Consequently, these species are known as *rare* or *endangered species*. These species contain genes which may have special value at some future time, and the stands in which they occur may be preadapted to future conditions, thus making them essential to the well-being of some future generation of people.

With the assistance of Professor William A. Weber, we have identified and shown on the map the following areas which have special interest because they are related to the above-described features of vegetation.

1. Northern limit of Gambel oak, *Quercus gambelii*, on the east slope of the Front Range.
2. Northeastern limit of Gambel oak, *Quercus gambelii*.
3. Shrub islands of locust, *Robinia pseudoacacia*, planted in the grasslands of the Rocky Mountain Arsenal.
4. Western limit of the American currant, *Ribes americanum*, in Roxborough Park.

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