

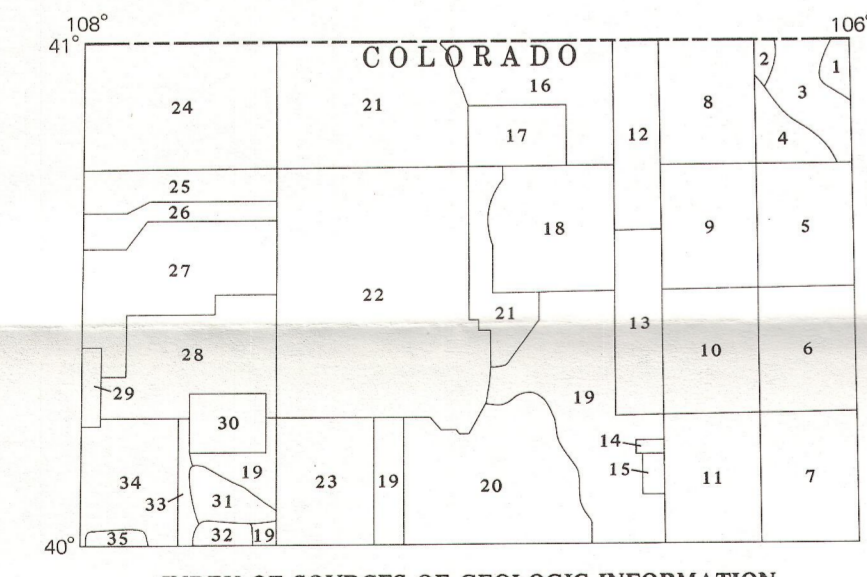
Base from U.S. Geological Survey, 1954-62
100,000-foot grid based on Colorado coordinate system, north zone
10,000-meter Universal Transverse Mercator grid ticks, zone 13, shown in blue

SCALE 1:250,000
25 MILES
25 KILOMETRES

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
DATUM IS MEAN SEA LEVEL

1975 MAGNETIC DECLINATION FOR THIS SHEET VARIES FROM 15°00' EASTERLY FOR THE CENTER OF THE WEST EDGE TO 14°00' EASTERLY FOR THE CENTER OF THE EAST EDGE

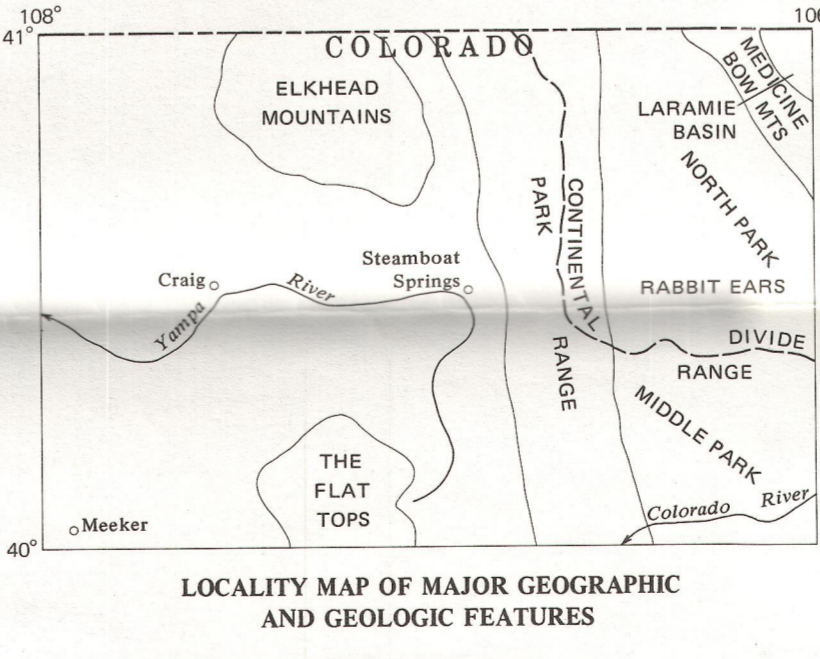
INTERIOR GEOLOGICAL SURVEY, RESTON, VA—THE NATIONAL CENTER FOR GEOLOGICAL INFORMATION
Geology compiled from sources listed, 1975



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LOCALITY MAP OF MAJOR GEOGRAPHIC AND GEOLOGIC FEATURES

CORRELATION OF MAP UNITS

DESCRIPTION OF MAP UNITS
(Where no map symbol is shown the formation is included elsewhere with other stratigraphic units)

UNCONSOLIDATED HOLOCENE DEPOSITS
Alluvium - Gravel, sand, silt, and clay in stream valleys and alluvial fans
Eolian deposits - Windblown sand and silt

UNCONSOLIDATED PLEISTOCENE DEPOSITS
Young glacial drift (Bull Lake and younger) - Unsorted bouldery glacial deposits (till) and associated sand and gravel deposits
Old glacial drift (pre-Bull Lake) - Terrace, outwash, alluvial-fan, and pediment gravels
Old glacial drift (pre-Bull Lake) - Unsorted bouldery glacial deposits (till) and associated gravels

PREGLACIAL GRAYEL (PLIOCENE) - Coarse unconsolidated gravel

BROWNS PARK FORMATION (MIOCENE) - Fluvial siltstone, claystone, and conglomerate, loosely consolidated eolian sandstone, and volcanic ash. Bouldery in place; conglomerate at base. Maximum thickness 2,000 ft (610 m)

NORTH PARK FORMATION (MIOCENE) - Fluvial siltstone, conglomerate, sandstone, limestone, claystone, and volcanic ash. Loosely consolidated. Maximum thickness about 800 ft (250 m)

TROUBLESPOME FORMATION (MIOCENE) - Chiefly siltstone, contains many beds of volcanic ash and some of sandstone and conglomerate. Maximum thickness 1,500 ft (457 m)

BASALT OF BIMODAL VOLCANIC SUITE (PLIOCENE AND MIOCENE) - Dense black hard resistant lava rock. Boulders derived from it are scattered over extensive areas

UPPER TERTIARY INTRUSIVE ROCKS (PLIOCENE AND MIOCENE - <20 m.y.) - Mainly porphyries of intermediate and basaltic compositions. Mainly in Elkhead Mountains
Dike or sill

VOLCANIC ROCKS (PLIOCENE, MIOCENE, AND OLIGOCENE) - Principally of intermediate compositions; include some basalt, tuffaceous siltstone, and bouldery volcanic breccia

MIDDLE TERTIARY INTRUSIVE ROCKS (MIOCENE AND OLIGOCENE - 20-35 m.y.) - Porphyries of intermediate compositions. Mainly in Rabbit Ears Range
Dike or sill

ASH-FLOW TUFF (OLIGOCENE) - Dense light-colored siliceous welded tuff

WHITE RIVER FORMATION (OLIGOCENE) - Light-gray to white soft tuffaceous siltstone and claystone. Thickness <200 ft (60 m)

WASATCH FORMATION (Eocene)
Cathedral Bluffs Tongue - Variegated fluvial claystone, mudstone, and sandstone. Thickness 1,000-1,500 ft (305-457 m)
Main body - Gray and pink fluvial arkosic sandstone, mudstone, and conglomerate. Maximum thickness about 5,000 ft (1,525 m)

TIPTON TONGUE OF GREEN RIVER FORMATION (Eocene) - Brown to gray lacustrine sandstone and papery carbonaceous shale. Thickness <500 ft (153 m)

FORT UNION FORMATION (PALEOCENE) - Dark brown and gray sandstone and shale; contains coal beds. Thickness about 1,500 ft (457 m)

OHIO CREEK FORMATION (PALEOCENE) - Coarse-grained white sandstone and conglomerate. Thickness <50 ft (15 m)

WASATCH AND OHIO CREEK FORMATIONS
Upper part - Gray and pink fluvial arkosic sandstone, mudstone, and conglomerate. Maximum thickness about 1,200 ft (366 m)
Lower part - Sandstone, siltstone, and shale. Thickness <500 ft (153 m)

COALMONT FORMATION (Eocene and PALEOCENE) - Sandstone, conglomerate, and carbonaceous shale; contains coal beds. Estimated maximum thickness 1,000 ft (305 m). Name is used in North Park. Largely equivalent strata in Middle Park are assigned to Middle Park Formation

MIDDLE PARK FORMATION
Upper part - Arkosic grit, sandstone, conglomerate, and mudstone; contains abundant andesitic volcanic debris in lower part. Estimated maximum thickness 7,000 ft (2,135 m). Name applied in Middle Park to strata largely equivalent to Coalmont Formation

WINDY GAP MEMBER (Upper Cretaceous?) - Dark andesitic volcanic breccia and volcanic conglomerate. Maximum thickness 1,100 ft (335 m)

UPPER CRETACEOUS INTRUSIVE ROCKS - Dark porphyritic augite syenite

LANCE FORMATION (UPPER CRETACEOUS) - Gray shale, light-brown sandstone, and a few coal beds. Thickness 1,000-1,500 ft (305-457 m)

LEWIS SHALE (UPPER CRETACEOUS) - Dark-gray homogeneous massive shale. Thickness 1,500-1,900 ft (457-580 m)

MEASURED GROUP UNDIVIDED (UPPER CRETACEOUS)

QUATERNARY
Kw Williams Fork Formation - Light-brown to white sandstone, gray shale, and coal beds. Thickness 1,100-2,000 ft (335-610 m)
Kl Iles Formation - Massive beds of light-brown to white sandstone and interbedded gray shale and coal. Thickness 1,500 ft (457 m)
Kp PIERRE SHALE (UPPER CRETACEOUS) - Dark-gray massive shale and a few thick beds of fine-grained sandstone. Maximum preserved thickness beneath pre-Coolmont or pre-Middle Park unconformity in North and Middle Parks 5,300 ft (1,615 m)

TERTIARY
Kmi MANCOS SHALE (UPPER AND LOWER CRETACEOUS) - Gray to dark-gray marine shale. Sandstone beds near top; calcareous sandstone of Upper Cretaceous Frontier Member 300-400 ft (90-120 m) above base, overlain by calcareous shale zone equivalent to Niobrara Formation; silver-gray siliceous shale of Lower Cretaceous Mowry Shale Member at base. Thickness about 5,000 ft (1,525 m)
Kmf Frontier Sandstone and Mowry Shale Members and intervening shale - Distinguished only locally on west side of Park Range. On east side, equivalent units are in Benton Shale of Colorado Group. Thickness about 500 ft (152 m)
Kc COLORADO GROUP (UPPER AND LOWER CRETACEOUS) - Consists of Upper Cretaceous Niobrara Formation (calcareous shale and many limestones) and Upper and Lower Cretaceous Benton Shale (dark bentonitic shale; calcareous sandstone and siliceous shale near base). Thickness 1,000-1,300 ft (305-395 m)
Kd DAKOTA SANDSTONE (LOWER CRETACEOUS) - Light-gray and tan sandstone or quartzite; some interbedded dark shale and shaly sandstone. Thickness 100-250 ft (30-75 m). Resistant, widely exposed unit but too thin to show separately at map scale in many areas
Kf MORRISON FORMATION (UPPER JURASSIC) - Variegated shale and mudstone, light-gray sandstone, and beds of fine-grained gray limestone. Locally conglomeratic near base. Thickness 300-500 ft (90-152 m)

JURASSIC
Kj CURTIS FORMATION (UPPER JURASSIC) - Yellowish-gray to pale-green glauconitic and oolitic marine limestone and sandstone. Thickness <100 ft (30 m); wedges out in places in Park Range. Equivalent unit in east part of map area is in Sundance Formation
Kk SUNDANCE FORMATION (UPPER JURASSIC) - Yellowish-gray to pink-green glauconitic and oolitic marine limestone and sandstone and crossbedded light-gray to orange sandstone containing local intertonguing red and yellow siltstone beds. Thickness 100-300 ft (30-90 m)
Kl ENTRADA SANDSTONE (UPPER JURASSIC) - Crossbedded light-gray to orange sandstone. Thickness generally 75-175 ft (23-53 m) but wedges out in places in Park Range. Equivalent unit in east part of map area is in Sundance Formation
Km GLEN CANYON SANDSTONE (LOWER JURASSIC AND UPPER TRIASSIC) - Crossbedded light-brown to light-gray sandstone that closely resembles the overlying Entrada, from which it is separated by a subtle unconformity. Maximum thickness about 100 ft (30 m)

TRIASSIC
Kn MESOZOIC ROCKS UNDIVIDED - Mainly of units below Pierre and Manos Shales. Shown only in small areas of complex structure
Kp Frontier Sandstone and Mowry Shale Members of Mancos Shale, and Dakota Sandstone
Kq Dakota, Morrison, Curtis, and Entrada Formations
Kr Dakota, Morrison, and Sundance Formations
Ks Morrison and Curtis Formations
Kt Morrison, Curtis, and Entrada Formations
Ku Morrison and Sundance Formations
Kv Morrison, Curtis, Entrada, and Glen Canyon Formations
Kw CHINLE FORMATION (UPPER TRIASSIC) - Brownish and purplish-red calcareous siltstone, mudstone, and sandstone; limestone-pebble conglomerate in lower part; Gaitra Sandstone Member present at base in most places (grayish-purple to white coarse-grained sandstone and conglomeratic sandstone 25 ft, or 8 m, thick). Thickness 600 ft (183 m) in west part of area; thins eastward beneath pre-Entrada unconformity to zero in places along Park Range. Equivalent strata near State line and northward are in Peppo Agie and Jelm Formations

PERMIAN
Kx BELL SPRINGS MEMBER OF NUGGET SANDSTONE (UPPER TRIASSIC?) - Reddish-brown sandstone and siltstone. Thickness about 50 ft (15 m)
Ky POPO AGIE FORMATION (UPPER TRIASSIC) - In Chugwater Group. Purple-red siltstone, sandstone, and claystone. Thickness about 120 ft (36 m)
Kz JELM FORMATION (UPPER TRIASSIC) - In Chugwater Group. Grayish-red to purple fine-grained micaceous sandstone. Thickness about 100 ft (30 m)

PENNSYLVANIAN
La RED PEAK FORMATION (LOWER TRIASSIC) - In Chugwater Group. Red calcareous siltstone and fine-grained sandstone. Thickness <100 ft (30 m)
Lb CHUGWATER FORMATION (TRIASSIC) - Red and gray sandstone, siltstone, shale, and conglomerate. Thickness in northern North Park 800 ft (244 m); thins to zero southward along Park Range
Lc CHINLE AND CHUGWATER FORMATIONS - On west flank of Park Range and northwestern Middle Park; Chugwater Formation in North Park
Ld GOOSE EGG FORMATION (LOWER TRIASSIC AND PERMIAN) - Thin red siltstone and gray limestone near base is only part present in quadrangle
Le Forde Limestone Member (Permian) - Gray limestone. Thickness <20 ft (6 m)

DEVONIAN
Lf STATE BRIDGE FORMATION (LOWER TRIASSIC AND PERMIAN) - Orange-red and red-brown siltstone and sandstone. Maximum thickness 500 ft (152 m); thins to zero in places along Park Range. In Meeker area, rocks of State Bridge are assigned by some geologists to Moenkopff (Lower Triassic) and Park City (Permian) Formations
Lg SATANKA SHALE (PERMIAN) - Red shale. Maximum thickness 135 ft (40 m)
Lh JELM AND RED PEAK FORMATIONS, FORELLE LIMESTONE MEMBER OF GOOSE EGG FORMATION, AND SATANKA SHALE IN LARAMIE BASIN; CHUGWATER FORMATION AND THIN UNITS OF FORELLE AND SATANKA IN NORTHEASTERN NORTH PARK; BELL SPRINGS MEMBER OF NUGGET SANDSTONE, POPO AGIE AND JELM FORMATIONS, AND REMNANTS OF RED PEAK FORMATION ON WEST SIDE OF PARK RANGE NEAR STATE LINE
Li CHINLE AND STATE BRIDGE FORMATIONS - In southern part of quadrangle
Lj WEBER SANDSTONE AND MAROON FORMATION
Lk WEBER SANDSTONE (PERMIAN AND PENNSYLVANIAN) - Yellow-gray sandstone. Thickness about 100 ft (30 m)
Ll MAROON FORMATION (PERMIAN AND PENNSYLVANIAN) - Maroon, grayish-red, and red-brown sandstone, conglomerate, and mudstone; lower part intertongues with gypsum of Eagle Valley Evaporite. Thickness in west part of quadrangle is variable, depending on relations to gypsum, but in places is at least 2,000 ft (610 m); thins eastward to zero beneath pre-State Bridge unconformity

CAMBRIAN
Lm MINTURN FORMATION (PENNSYLVANIAN) OR MORGAN FORMATION (PENNSYLVANIAN) IN WESTERN PART OF AREA - Gray and pale-colored sandstone, grit, conglomerate, and shale; intertongues with gypsum of Eagle Valley Evaporite. Thickness in west 1,900 ft (580 m); thins eastward by onlap to zero on flank of Park Range
Ln EAGLE VALLEY EVAPORITE (PENNSYLVANIAN) - Gypsum or anhydrite and interbedded gray shale, siltstone, and thin carbonate beds. Thickness uncertain owing both to diastrophic movements and to dissolution

PRECAMBRIAN Y
Lo CASPER AND FOUNTAIN FORMATIONS - Mapped only in Laramie basin
Lp CASPER FORMATION (PERMIAN AND PENNSYLVANIAN) - Buff sandstone. Thickness about 100 ft (30 m)
Lq FOUNTAIN FORMATION (LOWER PART) (PENNSYLVANIAN) - Red sandstone, grit, conglomerate, and shale. Thickness 700 ft (213 m)

PRECAMBRIAN X
Lr MISSISSIPPIAN, DEVONIAN, AND CAMBRIAN ROCKS - On west flank of Park Range at south edge of map. Thin units of Leadville (Mississippian), Gilman (Mississippian or Devonian), Swaych (Mississippian) and Devonian, Mariposa (Devonian), and Sawatch (Cambrian) Formations preserved pre-Minturn unconformity. Maximum total thickness <350 ft (107 m)
Ls MISSISSIPPIAN AND CAMBRIAN ROCKS - Small area at west edge of map only
Lt MIDDLE PARK GRANITE IN NORTHEAST CORNER OF AREA, ROCKS OF MOUNT Elletts Point in Park Range, and related rocks
Lu ROCKS OF - 1,700-m.y. AGE GROUP (PRECAMBRIAN X)
Lv GRANITIC ROCKS - Quartz monzonite, granodiorite, and quartz diorite composition; in part migmatitic and, in Medicine Bow Range, containing many small areas of gneisses
Lw Mafic intrusive rocks - Gabbro, diabase, and dark hornblende diorite
Lx INTERLAYERED FELSIC AND HORNBLENDED GNEISSES (PRECAMBRIAN X) - Probably mainly metavolcanic but includes some interlayers of pelitic biotite-sillimanite gneiss and schist and local pods of calc-silicate gneiss
Ly BIOTITIC GNEISSES AND MIGMATITE (PRECAMBRIAN X) - Probably mainly sedimentary

GEOLOGIC MAP OF THE CRAIG 1° x 2° QUADRANGLE, NORTHWESTERN COLORADO

Compiled by
Ogden Tweto

1976