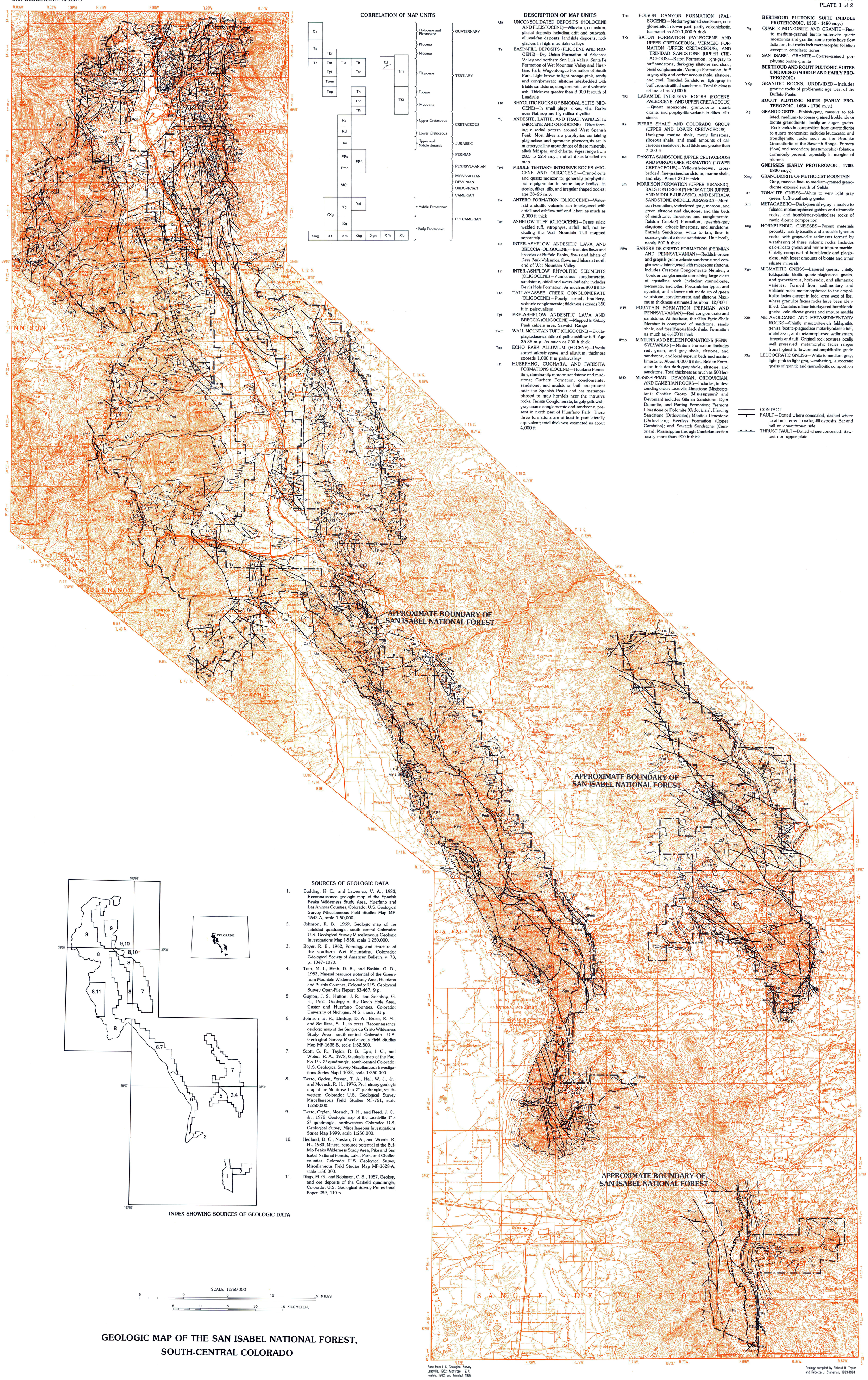

CORRELATION OF MAP UNITS

DESCRIPTION OF MAP UNITS

Qa UNCONSOLIDATED DEPOSITS (HOLOCENE AND PLEISTOCENE)—Alluvium, colluvium, glacial deposits including drift and outwash, alluvial-fan deposits, landslide deposits, rock glaciers in high mountain valleys

Ts BASIN-FILL DEPOSITS (PLIOCENE AND MIOCENE)—Dry Union Formation of Arkansas Valley and northern San Luis Valley, Santa Fe Formation of Wet Mountain Valley and Huerfano Park, Wagontongue Formation of South Park. Light-brown to light-orange-pink, sandy and conglomeratic siltstone interbedded with friable sandstone, conglomerate, and volcanic ash. Thickness greater than 3,000 ft south of Leadville

Tbr RHYOLITIC ROCKS OF BIMODAL SUITE (MIOCENE)—In small plugs, dikes, sills. Rocks near Nathrop are high-silica rhyolite

Td ANDESITE, LATITE, AND TRACHYANDESITE (MIOCENE AND OLIGOCENE)—Dikes forming a radial pattern around West Spanish Peak. Most dikes are porphyries containing plagioclase and pyroxene phenocrysts set in microcrystalline groundmass of these minerals, alkali feldspar, and chlorite. Ages range from 28.5 to 22.4 m.y.; not all dikes labelled on map

Tmi MIDDLE TERTIARY INTRUSIVE ROCKS (MIOCENE AND OLIGOCENE)—Granodiorite and quartz monzonite; generally porphyritic, but equigranular in some large bodies; in stocks, dikes, sills, and irregular shaped bodies; age 38-26 m.y.

Ta ANTERO FORMATION (OLIGOCENE)—Water-laid andesitic volcanic ash interlayered with airfall and ashflow tuff and lahar; as much as 2,000 ft thick

Taf ASHFLOW TUFF (OLIGOCENE)—Dense silicic welded tuff, vitrophyre, airfall, tuff, not including the Wall Mountain Tuff mapped separately

Tia INTER-ASHFLOW ANDESITIC LAVA AND BRECCIA (OLIGOCENE)—Includes flows and breccias at Buffalo Peaks, flows and lahars of Deer Peak Volcanics, flows and lahars at north end of Wet Mountain Valley

Tir INTER-ASHFLOW RHYOLITIC SEDIMENTS (OLIGOCENE)—Pumiceous conglomerate, sandstone, airfall and water-laid ash; includes Devils Hole Formation. As much as 800 ft thick

Ttc TALLAHASSEE CREEK CONGLOMERATE (OLIGOCENE)—Poorly sorted, bouldery, volcanic conglomerate; thickness exceeds 350 ft in paleovalleys

Tpl PRE-ASHFLOW ANDESITIC LAVA AND BRECCIA (OLIGOCENE)—Mapped in Grizzly Peak caldera area, Sawatch Range

Twm WALL MOUNTAIN TUFF (OLIGOCENE)—Biotite-plagioclase-sanidine rhyolite ashflow tuff. Age 35-36 m.y. As much as 200 ft thick

Tep ECHO PARK ALLUVIUM (EOCENE)—Poorly sorted arkosic gravel and alluvium; thickness exceeds 1,000 ft in paleovalleys

Th HUERFANO, CUCHARA, AND FARISITA FORMATIONS (EOCENE)—Huerfano Formation, dominantly maroon sandstone and mudstone; Cuchara Formation, conglomerate, sandstone, and mudstone; both are present near the Spanish Peaks and are metamorphosed to gray hornfels near the intrusive rocks. Farisita Conglomerate, largely yellowish-gray coarse conglomerate and sandstone, present in north part of Huerfano Park. These three formations are at least in part laterally equivalent; total thickness estimated as about 4,000 ft

Tpc POISON CANYON FORMATION (PALEOCENE)—Medium-grained sandstone, conglomeratic in lower part; partly volcaniclastic. Estimated as 500-1,000 ft thick

TKr RATON FORMATION (PALEOCENE AND UPPER CRETACEOUS), VERMEJO FORMATION (UPPER CRETACEOUS), AND TRINIDAD SANDSTONE (UPPER CRETACEOUS)—Raton Formation, light-gray to buff sandstone, dark-gray siltstone and shale, basal conglomerate. Vermejo Formation, buff to gray silty and carbonaceous shale, siltstone, and coal. Trinidad Sandstone, light-gray to buff cross-stratified sandstone. Total thickness estimated as 7,000 ft

TKi LARAMIDE INTRUSIVE ROCKS (EOCENE, PALEOCENE, AND UPPER CRETACEOUS)—Quartz monzonite, granodiorite, quartz diorite, and porphyritic variants in dikes, sills, stocks

Ks PIERRE SHALE AND COLORADO GROUP (UPPER AND LOWER CRETACEOUS)—Dark-gray marine shale, marly limestone, siliceous shale, and small amounts of calcareous sandstone; total thickness greater than 7,000 ft

Kd DAKOTA SANDSTONE (UPPER CRETACEOUS) AND PURGATOIRE FORMATION (LOWER CRETACEOUS)—Yellowish-brown, cross-bedded, fine-grained sandstone, marine shale, and clay. About 270 ft thick

Jm MORRISON FORMATION (UPPER JURASSIC), RALSTON CREEK(?) FROMATION (UPPER AND MIDDLE JURASSIC), AND ENTRADA SANDSTONE (MIDDLE JURASSIC)—Morrison Formation, varicolored gray, maroon, and green siltstone and claystone, and thin beds of sandstone, limestone and conglomerate. Ralston Creek(?) Formation, greenish-gray claystone, arkosic limestone, and sandstone. Entrada Sandstone, white to tan, fine- to coarse-grained arkosic sandstone. Unit locally nearly 500 ft thick

PIPs SANGRE DE CRISTO FORMATION (PERMIAN AND PENNSYLVANIAN)—Reddish-brown and grayish-green arkosic sandstone and conglomerate interlayered with micaceous siltstone. Includes Crestone Conglomerate Member, a boulder conglomerate containing large clasts of crystalline rock (including granodiorite, pegmatite, and other Precambrian types, and syenite), and a lower unit made up of green sandstone, conglomerate, and siltstone. Maximum thickness estimated as about 12,000 ft

PIPf FOUNTAIN FORMATION (PERMIAN AND PENNSYLVANIAN)—Red conglomerate and sandstone. At the base, the Glen Eyrie Shale Member is composed of sandstone, sandy shale, and fossiliferous black shale. Formation as much as 4,400 ft thick

IPmb MINTURN AND BELDEN FORMATIONS (PENNSYLVANIAN)—Minturn Formation includes red, green, and gray shale, siltstone, and sandstone, and local gypsum beds and marine limestone. About 4,000 ft thick. Belden Formation includes dark-gray shale, siltstone, and sandstone. Total thickness as much as 500 feet

MCr MISSISSIPPIAN, DEVONIAN, ORDOVICIAN, AND CAMBRIAN ROCKS—Includes, in descending order: Leadville Limestone (Mississippian); Chaffee Group (Mississippian? and Devonian) includes Gilman Sandstone, Dyer Dolomite, and Parting Formation; Fremont Limestone or Dolomite (Ordovician); Harding Sandstone (Ordovician); Manitou Limestone (Ordovician); Peerless Formation (Upper Cambrian); and Sawatch Sandstone (Cambrian). Mississippian through Cambrian section locally more than 900 ft thick

BERTHOUD PLUTONIC SUITE (MIDDLE PROTEROZOIC, 1350 - 1480 m.y.)

Yg QUARTZ MONZONITE AND GRANITE—Fine- to medium-grained biotite-muscovite quartz monzonite and granite; some rocks have flow foliation, but rocks lack metamorphic foliation except in cataclastic zones

Ysi SAN ISABEL GRANITE—Coarse-grained porphyritic biotite granite

BERTHOUD AND ROUTT PLUTONIC SUITES UNDIVIDED (MIDDLE AND EARLY PROTEROZOIC)

YXg GRANITIC ROCKS, UNDIVIDED—Includes granitic rocks of problematic age west of the Buffalo Peaks

ROUTT PLUTONIC SUITE (EARLY PROTEROZOIC, 1650 - 1730 m.y.)

Xg GRANODIORITE—Pinkish-gray, massive to foliated, medium- to coarse grained horblende or biotite granodiorite; locally an augen gneiss. Rock varies in composition from quartz diorite to quartz monzonite; includes leucocratic and trondhjemitic rocks such as the Kroenke Granodiorite of the Sawatch Range. Primary (flow) and secondary (metamorphic) foliation commonly present, especially in margins of plutons

GNEISSES (EARLY PROTEROZOIC, 1700-1800 m.y.)

Xmg GRANODIORITE OF METHODIST MOUNTAIN—Gray, massive fine- to medium-grained granodiorite exposed south of Salida

Xt TONALITE GNEISS—White to very light gray green, buff-weathering gneiss

Xm METAGABBRO—Dark-greenish-gray, massive to foliated metamorphosed gabbro and ultramafic rocks, and hornblende-plagioclase rocks of mafic dioritic composition

Xhg HORNBLENDIC GNEISSES—Parent materials probably mainly basaltic and andesitic igneous rocks, with graywacke sediments formed by weathering of these volcanic rocks. Includes calc-silicate gneiss and minor impure marble. Chiefly composed of hornblende and plagioclase, with lesser amounts of biotite and other silicate minerals

Xgn MIGMATITIC GNEISS—Layered gneiss, chiefly feldspathic biotite-quartz-plagioclase gneiss, and garnetiferous, horblendic, and sillimanitic varieties. Formed from sedimentary and volcanic rocks metamorphosed to the amphibolite facies except in local area west of Ilse, where granulite facies rocks have been identified. Contains minor interlayered hornblende gneiss, calc-silicate gneiss and impure marble

Xfh METAVOLCANIC AND METASEDIMENTARY ROCKS—Chiefly muscovite-rich feldspathic geniss, biotite-plagioclase metarhyodacite tuff, metabasalt, and metamorphosed sedimentary breccia and tuff. Original rock textures locally well preserved; metamorphic facies ranges from highest to lowermost amphibolite grade

Xlg LEUCOCRATIC GNEISS—White to medium-gray, light-pink to light-gray weathering, leucocratic gneiss of granitic and granodioritic composition

CONTACT

FAULT—Dotted where concealed, dashed where location inferred in valley-fill deposits. Bar and ball on downthrown side

THRUST FAULT—Dotted where concealed. Sawteeth on upper plate

INDEX SHOWING SOURCES OF GEOLOGIC DATA

SOURCES OF GEOLOGIC DATA

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GEOLOGIC MAP OF THE SAN ISABEL NATIONAL FOREST, SOUTH-CENTRAL COLORADO

Base from U.S. Geological Survey Leadville, 1962; Montrose, 1977; Pueblo, 1962; and Trinidad, 1962

Geology compiled by Richard B. Taylor and Rebecca J. Stoneman, 1983-1984