WYOMING STATE GEOLOGICAL SURVEY
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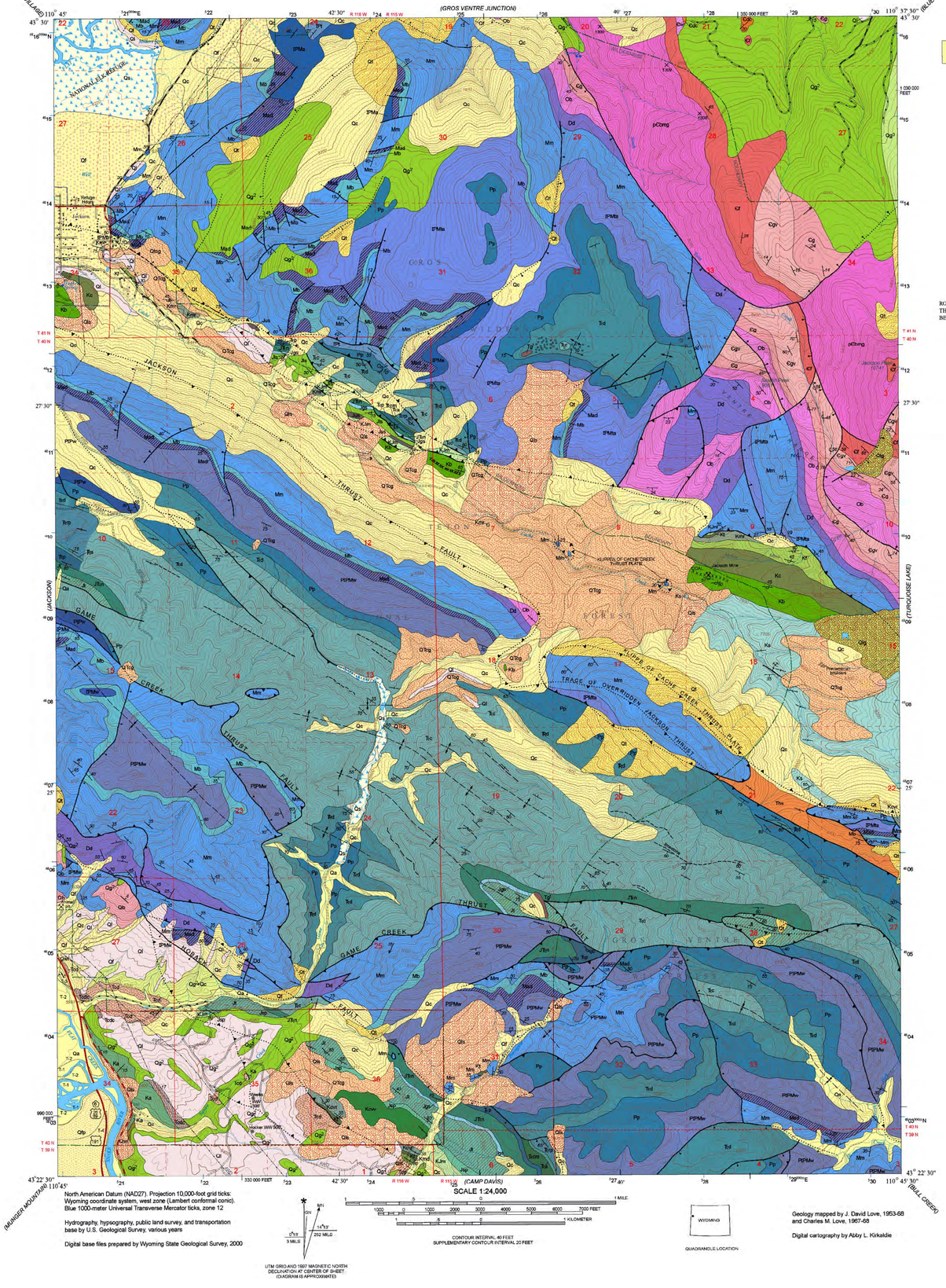
Geology -- Interpreting the past to provide for the future

Prepared in cooperation with the U.S. GEOLOGICAL SURVEY

J. DAVID LOVE HISTORICAL GEOLOGIC MAP SERIES
GEOLOGY OF THE TETON - JACKSON HOLE REGION
Map LMS-1
Cache Creek Quadrangle, Teton County, Wyoming



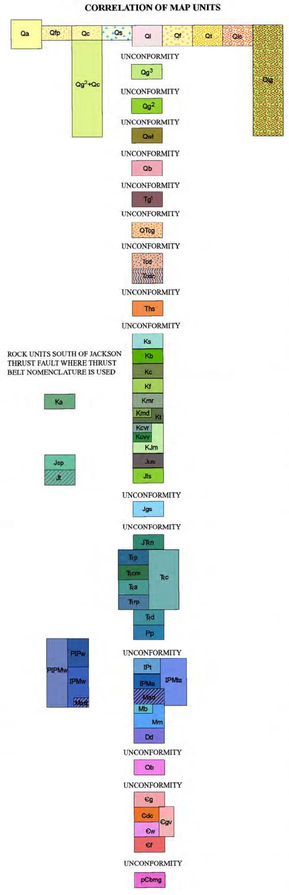
GEOLOGIC MAP OT THE CACHE CREEK QUADRANGLE, TETON COUNTY, WYOMING

by

J. David Love and Charles M. Love

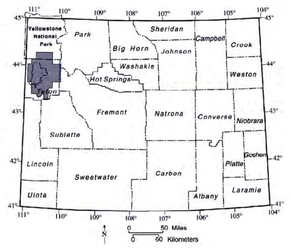
2000

CORRELATION OF MAP UNITS



MAP SYMBOLS

- **Formation contact**
- **Fault -** Sense of motion or displacement not specified
- **Normal fault -** Dotted where concealed or inferred. Bar and ball on downthrown side
- **Thrust or reverse fault -** Dotted where concealed or inferred. Sawteeth are on upper plate
- **Thrust fault with younger normal fault along the same trace -** Dotted where concealed or inferred. Sawteeth on upper plate of thrust fault. Bar and ball on downthrown side of normal fault
- **Anticline -** Showing crestline. Dotted where concealed or inferred
- **Syncline -** Showing troughline. Dotted where concealed or inferred
- **Strike and dip of beds**
  - **Inclined**
  - **Vertical**
  - **Overturned**
  - **Horizontal**
  - **Generalized direction of dip without strike**
- **Mappable bed**
- **Water well -** Number indicates depth in feet
- **Mine or prospect**
- **U.S. Geological Survey phosphate trench and number**
- **Selected spring**
- **Lag erratics, too sparse to map**
- **Coal bed**
- **J.C. Reed, Jr., station in Precambrian rocks**
- **Wilderness area boundary**



GENERAL LOCATION MAP

DESCRIPTION OF MAP UNITS

Alluvium (Quaternary) - Valley and stream deposits of gravel with lesser amounts of sand, silt, and clay. T-1, gravel and sand at and slightly above Snake River level. T-2, dots mark outer boundary of terrace surface 10 to 15 feet (3.1 to 4.6 m) above Snake River; surface consists of thin discontinuous deposits of sand and silt underlain by gravel. T-3, dots mark outer boundary of terrace surface 15 to 25 feet (4.6 to 7.6 m) above T-2 and 10 to 15 feet (3.1 to 4.6 m) below T-4

Holocene surficial deposits

Flood-plain deposits - Sand, silt, clay, and minor lenses of gravel; lesser amount of gravel at surface distinguishes these deposits from alluvium along topographically lower stream valleys. T-4, dots mark outer boundary of broad alluvial surface 30 to 40 feet (9 to 15 m) above Snake River and 10 to 15 feet (3.1 to 4.6 m) above T-3. Three to 6 feet (1 to 2 m) of fine material overlies gravel

Colluvium - Slope wash of silt- to boulder-sized fragments derived from underlying and adjacent units

Swamp deposits - Clay, silt, and fine sand, dark-gray, and brown; rich in vegetal debris

Holocene and Pleistocene surficial deposits

Loess (Pleistocene) - Light-gray, structureless, homogeneous; wind-deposited silt. Gastropods from several localities in adjoining quadrangles to the north and northwest have a ^{14}C age ranging from 13,000 to 19,000 years

Alluvial fan deposits - Crudely stratified deposits of gravel, silt, and clay that spread outward from mouths of ravines and canyons; deposits show linear sorting along distributaries: finer debris is progressively more abundant toward downstream margins of fans

Talus deposits (including rock layers) - Locally derived coarse, angular rock fragments that accumulated on steep slopes and at base of cliffs; merge in places with the youngest glacial moraines

Landslide debris - Chaotically mixed boulders and finer rock debris emplaced by mass movement

Landslide and glacial debris intermixed

Pleistocene deposits

Glacial debris of third (and youngest) (Pinedale) major glaciation - Morainal debris with sharp rough unmodified surface topography; little weathering of rock fragments, and sparse soil development

Glacial debris of second (Bull Lake) major glaciation - Very old formless piles and lag deposits of large and small erratics, in places mixed with outwash gravel, sand, and silt; most erratics are not locally derived and the softer ones are deeply weathered; extensive soil development in some places. In some areas, may consist of slightly younger morainal debris with subdued surface topography; moderately weathered rock fragments; capped by loess and soil in many places

Glacial debris of second (Bull Lake) major glaciation - Intermixed with locally derived colluvium

White lacustrine deposits - Fine white silt and clay, thinly laminated in part, interbedded with river gravel; accumulated near upstream end of lake impounded behind Bailey Creek slide that temporarily blocked the Snake River about 14 miles (22 km) downstream

Lithified talus breccia - Angular fragments of Paleozoic rocks, chiefly Madison Limestone, in matrix of white to pink limy cement. Debris is locally derived from bedrock outcrops east of Hoback fault and is involved in later eastward tilting and faulting. Thickness varies; maximum more than 500 feet (150 m)

Quaternary or Tertiary sedimentary rocks

Glacial debris of first (oldest) major glaciation in this area - Tightly cemented (with gray lime cement) as well as unlithified formless unstratified gray deposits of unsized and unsorted round to angular fragments of Mesozoic, Paleozoic, and sparse Precambrian granitic rocks; most are not locally derived and some were brought long distances at a time when present drainage systems were either nonexistant or were buried by ice

Unnamed conglomerate - Partially lithified gray limestone conglomerate that accumulated in the Cache Creek valley to a depth of 400 feet (122 m); remnants of a possibly correlative conglomerate cap hills in southwest part of quadrangle; contains sparse Precambrian clasts from an unknown source; may be related to Tg^1 glaciation

Camp Davis Formation (Upper Miocene[1]) - Upper unit consists of red conglomerate containing Paleozoic clasts in the upper part and Triassic clasts in the lower part; because much of the upper part of the formation is overridden by detachment masses of Mesozoic rocks, only 1000 feet (300 m) of the 4000 feet (1220 m) comprising the upper conglomerate unit 1.5 miles (2.4 km) to the south is present in this quadrangle. Below the upper conglomerate unit is about 1000 feet (300 m) of red soft claystone, red soft sandstone and siltstone, and red conglomerate in about equal amounts, overlying about 200 feet (60 m) of white limestone, pumicite, diatomite, and gray soft claystone, which overlies a basal conglomerate, mapped separately and described below

Gray cliff-forming conglomerate - Composed chiefly of Paleozoic rock fragments, 250 to 294 feet (75 to 90 m) thick

Hoback Formation

Skyline Trail Conglomerate Member of Dorr, Spearing, and Steidtmann, 1977 (Lowest Eocene or Paleocene) - Tightly cemented red conglomerate of angular to subround clasts of Mesozoic and Paleozoic rocks derived from the Gros Ventre Range. Only a partial section of about 1000 feet (300 m) is present, with top and bottom cut off by faults

Sohare Formation (Upper Cretaceous) - Gray and tan lenticular fine-grained sandstone, gray shale and shaly sandstone, carbonaceous shale, marlstone, and some beds of coal of minable thickness, chiefly in middle. Upper part cut off by faults. Thickness at least 5000 feet (1525 m)

Bacon Ridge Sandstone (Upper Cretaceous) - Light gray to tan, fine- to medium-grained, massive to thick-bedded fossiliferous sandstone with abundant black grains. Contains coal of minable thickness at Jackson Mine (abandoned). Bentonite and plastic gray shale in middle part are sites of large landslides. Thickness about 750 feet (230 m)

Cody Shale (Upper Cretaceous) - Gray to dark-gray shale and a few thin hard fine-grained glauconitic sandstones; sparse marine fossils. Thickness uncertain because of tectonic squeezing; it could be as little as 1000 feet (300 m) or as much as 2000 feet (600 m)

Frontier Formation (Upper Cretaceous) - Gray to tan fine- to medium-grained sandstone, gray to black shale, thin coaly partings, thin bentonites and porcellanites. Thickness uncertain because of tectonic squeezing; in normal sections it is about 1000 feet (300 m)

Mowry Shale (Upper Cretaceous) - Dark-gray to black siliceous shale, dense hard silicified speckled sandstone, and thin bentonites; many shales weather silvery gray and are characterized by abundant fish scales. Thickness uncertain but probably between 500 and 700 feet (150-215 m)

Aspen Shale (Upper Cretaceous) - Gray to greenish-gray siliceous shale and brittle siltstone, siliceous hard fine-grained sandstone, thin porcellanite and bentonite beds. No complete section is present in area

Thermopolis Shale (Lower Cretaceous) - Black, very fine-grained highly fissile soft shale 100 to 200 feet (30 to 61 m) thick; thin beds of bentonite and rusty fine-grained sandstone

Muddy Sandstone Member - Gray medium-grained soft crossbedded sandstone; occurs at top of formation; 50 to 100 feet (15 to 30 m) thick

Cloverly and Morrison (?) Formations undivided (Lower Cretaceous and (?)

Upper Jurassic) - Three units are present, the upper and middle mapped separately in some places and described below. The lowermost unit is buff and gray chloritic, in part sparkly, sandstone interbedded with red, green, and gray siltstone and claystone; 185 to 250 feet (56 to 76 m) thick

Uppermost unit (commonly known as the "rusty beds member" of Cloverly Formation - Olive-green, gray, and buff thin-bedded sandstones that weather with a conspicuous rusty color; in the southwestern corner of the quadrangle, contains a unique silicified mollusean fauna; 100 to 250 feet (30 to 76 m) thick

Middle unit - Variegated red, gray, lilac-colored, and pink claystone containing thin beds of hard nodular dense cream-colored limestone; 290 to 545 feet (88 to 166 m) thick

Sundance Formation (Upper and Middle Jurassic)

"Upper Sundance" - Glauconitic gray, buff, and green very limy sandstone and a few thin shale and limestone beds, 75 to 140 feet thick (23 to 43 m)

"Lower Sundance" - Gray limy plastic to splintery shale, clayey limestones, hard oolitic limestone, and one or more zones of red plastic shale; 450 to 550 feet (137 to 168 m) thick north of the Jackson thrust fault and nearly 800 feet (245 m) thick in the overthrust facies south of this fault

Stump and Preuss sandstones (Upper Jurassic) - Lithology and thickness same as for the "Upper Sundance" except that the thin Preuss Sandstone at the base is red, shaly, and non-glauconitic. Terminology used only in the thrust belt facies

Twin Creek Limestone (Upper and Middle Jurassic) - Lithology and thickness same as for the "Lower Sundance." Terminology only used in the thrust belt facies

Gypsum Spring Formation (Middle Jurassic) - Red shale, slabby gray dolomite, and white gypsum. In most outcrops the gypsum has been leached out, leaving a lithified carbonate breccia that forms rounded cliffs. Thickness 50 to 150 feet, (15 to 46 m) depending on the amount of leaching of gypsum

Nugget Sandstone (Jurassic and Triassic) - Light tan to salmon-pink, fine-grained, cross-bedded, hard brittle cliff-forming sandstone characterized by large frosted rounded quartz grains in a finer matrix. Thickness about 375 feet (115 m)

Chugwater Formation (Triassic) - Separate members are mapped only in extreme western part of quadrangle

Popo Agie Member - Ocher and purple claystone, red shale, lenticular purple limestone-pellet conglomerates, and red siltstone; 200 to 300 feet (61 to 91 m) thick

Crow Mountain Sandstone Member - Red to salmon-pink soft porous sandstone containing large frosted rounded quartz grains in a finer matrix; 50 to 100 feet (15 to 30 m) thick

Alcova Limestone Member - Gray and purple thin-bedded hard limestone and dolomite with interbeds of white gypsum, 15 to 60 feet (3 to 18 m) thick

Red Peak Member - Red gypsiferous siltstone and very fine-grained sandstone with some red shale partings; 850 to 1275 feet (260 to 390 m) thick. Beds of gray silty limestone and gray quartzitic sandstone thicken southwestward in the thrust belt facies

Dinwoody Formation (Lower Triassic) - Siltstone, brownish-gray to olive-drab, hard, slabby, thin-bedded, dolomitic; contains thin partings of fine-grained dolomitic sandstone and silty limestone. Thickness 200 to 450 feet (61 to 140 m)

Phosphoria Formation and equivalent units (Permian) - Dolomite, chert, phosphorite, and black shale. Dolomite and chert are dark gray to brown, sandy, chiefly in upper part, phosphorite and black shale at top and lower part. Thickness 180 to 235 feet (55 to 72 m)

Tensleep Sandstone (Pennsylvanian) - Sandstone light-gray, weathering yellowish-brown, fine-grained, hard, brittle, quartzitic in part. Middle and lower parts contain many beds of gray fine-grained limestone and dolomite. Contact with underlying Amsden Formation transitional. Thickness 400 to 450 feet (122 to 137 m)

Amsden Formation (Pennsylvanian and Upper Mississippian) - Shale and siltstone, brick-red, red-brown, and green, interbedded with white dolomite and limestone. Several zones contain ocher and carnelian-red chert nodules. Thickness exclusive of Darwin Sandstone Member about 450 feet (140 m)

Darwin Sandstone Member (Upper Mississippian) - Gray to brownish-pink, fine- to medium-grained sandstone with some large rounded frosted quartz grains; crossbedded, moderately soft and porous; red shale partings near top. Thickness 75 to 100 feet (23 to 30 m)

Wells Formation and associated rocks

Upper unit (Permian and Pennsylvanian) - Sandstone, light-gray hard, fine-grained; contains gray limestone beds which are more abundant in lower part. In places, uppermost part contains chalk-white brittle very fine-grained dolomite and gray chert. Thickness 450 to 500 feet (137 to 152 m). Terminology used only in thrust belt facies south of the Jackson thrust fault

Lower unit (Pennsylvanian and Upper Mississippian) - limestone, bluish-gray, hard, interbedded with red and green shale and tan to white fine-grained sandstone. Carnelian-red and mustard-yellow chert nodules and thin lenses are conspicuous. Thickness about 450 feet (140 m). Terminology used only in thrust belt facies south of the Jackson thrust fault

Wells Formation and associated rocks undivided (Permian, Pennsylvanian, and Upper Mississippian)

Tensleep and Amsden formations undivided (Pennsylvanian and Upper Mississippian) - Includes Darwin Sandstone in some places

Madison Limestone

Bull Ridge Member (Upper Mississippian) - Shale and siltstone, red, interbedded with orange-red to tan sandstone, tan to pink dolomite breccia, and blue-gray ledge-forming limestone containing highly distinctive red and "zebra-striped" gray and black chert nodules. Not mapped separately on cliff faces or in areas of intense deformation. Thickness 50 to 100 feet (15 to 30 m)

Main Part (Upper and Lower Mississippian) - Limestone, light- to dark-gray, thick-bedded to massive in upper part, thin-bedded and dolomitic in lower part; vuggy brown dolomite near base, many layers and lenses of black chert. Thickness about 1100 to 1500 feet (335 to 460 m), with thickest sections south of the Jackson thrust fault

Darby Formation (Upper and Middle Devonian) - Upper part is dolomitic siltstone and shale, dull-yellow, thin-bedded, lower part is brown fetid vuggy siliceous brittle dolomite containing sparse thin limestone beds. Thickness is 300 to 500 feet (91 to 150 m), with thickest sections south of the Jackson thrust fault

Bighorn Dolomite (Upper Ordovician) - Dolomite, with light- and dark-gray mottling, siliceous, cliff-forming. Leigh Dolomite Member at top of cliffs (not mapped separately), about 50 feet (15 m) thick, forms slope and consists of chalk-white very fine-grained brittle dolomite. Thickness ranges from 200 feet (61 m) north of the Jackson thrust fault to 500 feet (150 m) south of the fault in the thrust belt

Gallatin Limestone (Upper Cambrian) - Limestone, bluish-gray, mottled, with irregular granular yellow patches; irregularly bedded, hard; forms ragged cliffs. Thickness 180 to 240 feet (55 to 73 m)

Gros Ventre Formation (Upper and Middle Cambrian)

Park Shale and Death Canyon Limestone Members, undivided

Park Shale Member - Green to gray highly fissile micaceous shale containing numerous algal heads at base, 150 to 350 feet (45 to 105 m) thick

Death Canyon Limestone - Hard blue-gray to dark-gray fine-grained thin-bedded limestone, mottled with brown and tan irregular limestone blotches; conspicuous cliff-former. At base is a distinctive bed of brown-weathering dolomite. Thickness 300 to 370 feet (90 to 115 m)

Wolsey Shale Member - Green to gray-green highly fissile micaceous shale; about 100 feet (30 m) thick

Flathead Sandstone (Middle Cambrian) - Sandstone, white, tan, brown and maroon, crossbedded, locally conglomeratic near base; locally quartzitic. Thin partings of green micaceous shale are in upper part; contact with overlying Wolsey Shale Member is transitional. Thickness 200 to 300 feet (61 to 91 m)

Granitic rocks of the Gros Ventre Range (Proterozoic)

[1] In conformity with the European and marine time scales which place the Miocene - Pleistocene boundary at about 5 million years, the Camp Davis Formation, previously considered to be early Pliocene age, is now placed in the Miocene.

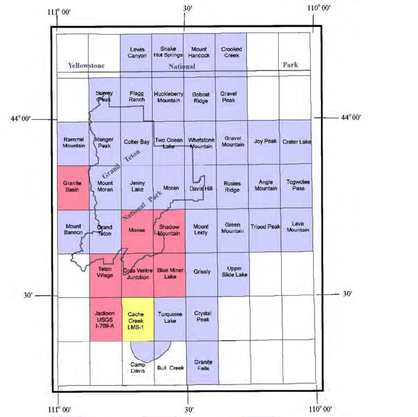
REFERENCES CITED

Dorr, J.A., Jr., Spearing, D.R., and Steidtmann, J.R., 1977, Deformation and deposition between a foreland uplift and an impinging thrust belt: Hoback Basin, Wyoming: Geological Society of America Special Paper 177, 82 p.

Love, C.M., 1968, Geology surrounding the headwaters of Nowlin, Flat, and Granite Creeks, Gros Ventre Range, Teton County, Wyoming: M.S. thesis, Montana State University, Bozeman, 106 p.

Love, J.D., and Albee, H.F., 1972, Geologic map of the Jackson Quadrangle, Teton County, Wyoming: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-769-A, scale 1:24,000, 1 sheet.

Love, J.D., and Love, C.M., 1978, Geologic map of the Cache Creek Quadrangle, Teton County, Wyoming: U.S. Geological Survey Open-File Report 78-480, scale 1:24,000, 1 sheet.



INDEX TO LOVE MAP SERIES SHOWING LOCATION OF 7.5-MINUTE QUADRANGLES AND MAPPING PROGRESS