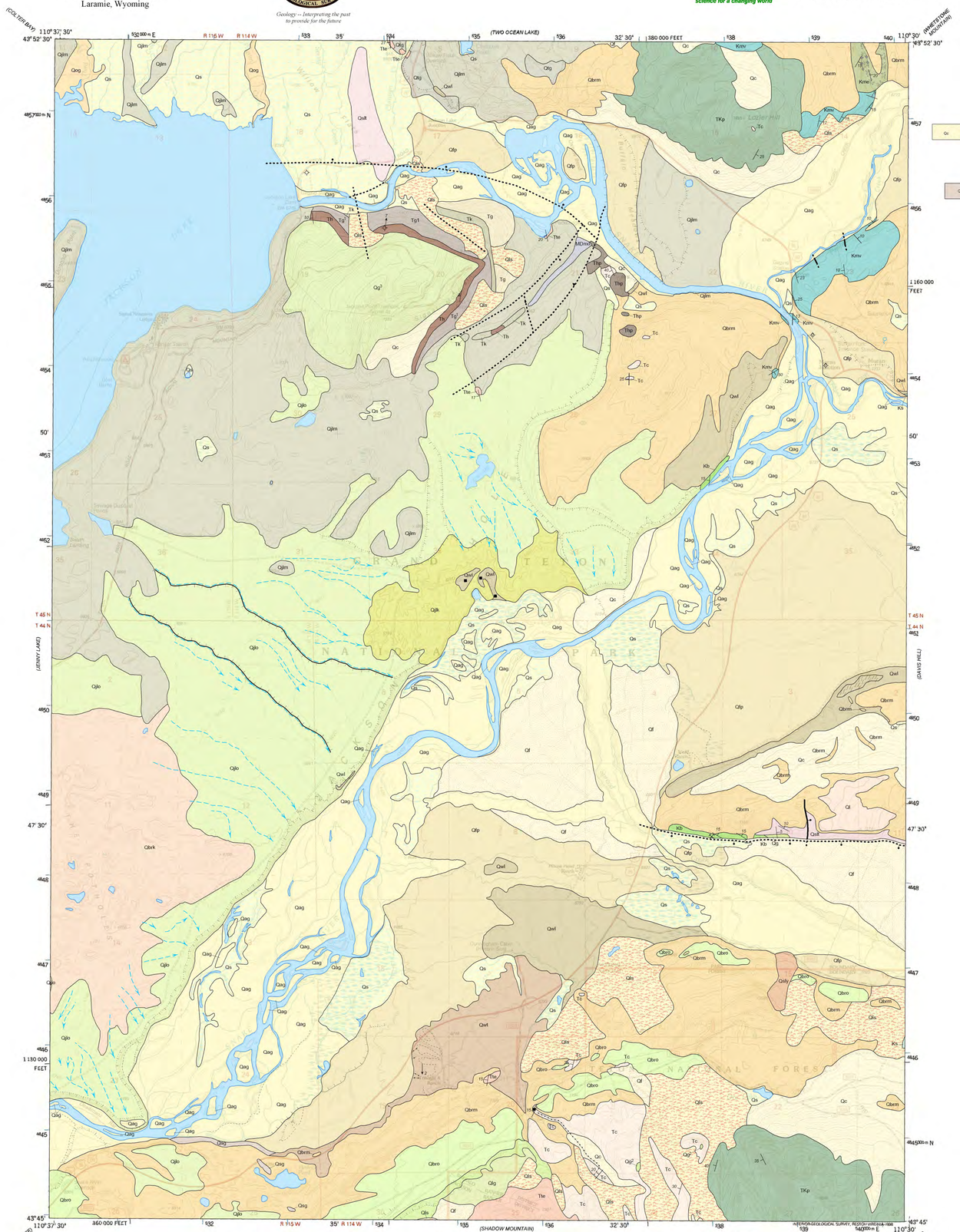
WYOMING STATE GEOLOGICAL SURVEY
Lance Cook, State Geologist
Laramie, Wyoming

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-11
Moran Quadrangle, Teton County, Wyoming



North American Datum (NAD27). Projection 10,000-foot grid ticks: Wyoming coordinate system, west zone (Lambert conformal conic). Blue 1000-meter Universal Transverse Mercator ticks, zone 12

Hydrography, hypsography, public land survey, and transportation base by U.S. Geological Survey, various years

Digital base files prepared by Wyoming State Geological Survey, 2000

Map projection: Lambert Conformal Conic.
Horizontal datum: North American Datum of 1927.

Digital cartography by Phyllis A. Ranz

MN
GN
14°28'
243 MILS
0°18'
6 MILS

SCALE 1:24,000

1 0.5 0 1 Mile

1,000 500 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometer

Topographic Contour Interval 40 feet
Bathymetric Interval 25 feet

WYOMING
QUADRANGLE LOCATION

GEOLOGIC MAP OF THE MORAN QUADRANGLE, TETON COUNTY, WYOMING

by
J. David Love
2004

Geology mapped by J. D. Love, 1950-73.

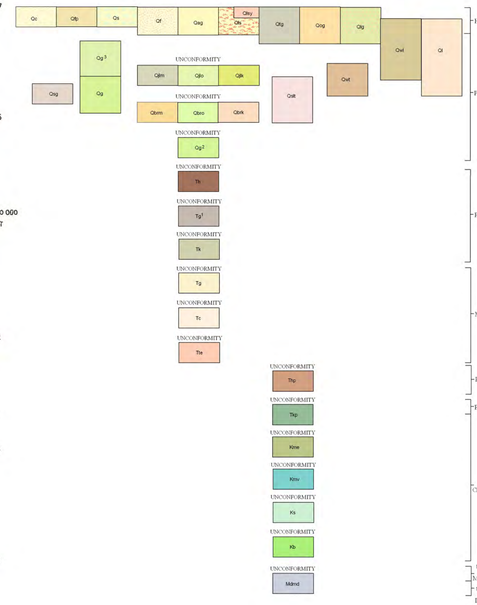
People with disabilities who require an alternative form of communication in order to use this publication should contact the Editor, Wyoming State Geological Survey, TTY Relay Operator 1 (800) 877 - 9975.

Additional copies of this map can be obtained from:
Wyoming State Geological Survey
P.O. Box 1347 Laramie, WY 82073
Phone: (307) 766-2286 Fax: (307) 766 - 2605
Email: sales@ uwyo.edu

A digital version of this map is also available on CD - ROM.

EXPLANATION

CORRELATION OF MAP UNITS



MAP SYMBOLS

Formation contact

Normal fault— Dashed where concealed; ball and bar on downthrown side

Thrust fault— Concealed; sawteeth on upper plate

Strike and dip of beds

Inclined

Vertical

Horizontal

Generalized direction of dip without strike— Arrow without number indicates general dip of beds

Measured section— Name of section shown; offsets shown by dotted line

Spring

Artesian water well— depth unknown

Linear feature— conspicuous on aerial photographs—In bedrock units generally indicates trace of joint, layering, vein, fracture zone, or bedding. In surficial deposits indicates crest of morainal ridge, protalus rampart, ridge on rock glacier, or outlines of talus lobe

Mine or prospect

Locality for fossils or isotope age dates

Fan deposit boundary

Conglomerate beds in Meeteetse Formation— may approximate bedding in some places

Marker beds or fossil beds, as specified

Selected stream channelway— Most have been abandoned because of subsequent drainage changes

Outlet channel for Jackson Lake

Terrace sequence— Dots mark outer boundary of terrace surface except where terrace marks contact between two mappable units; in those places the contact is shown as solid line with hachures on downslope side. Dotted or solid hachured lines within mappable unit depict terrace margins; hachures on downslope side. Terrace levels are mapped on the basis of relative height above river level of adjacent terraces; numbering system does not necessarily imply equivalency on opposite sides of rivers; local, unnamed terrace levels are shown only on map

Terraces related to east side of the Snake River:

ET-1 At and within 10 feet (3 m) of present river level

ET-1A 1 to 2 feet (.3 to .6 m) above terrace ET-1

ET-2 12 feet (3.7 m) above present river level

ET-3 5 to 15 feet (1.5 to 4.6 m) above present river level; 12 feet (3.7 m) above terrace ET-2 (where present) in northeastern part of quadrangle

ET-3A 30 feet (9.1 m) above present river level

ET-4 40 feet (12.2 m) above present river level

Terraces related to west side of Snake River:

WT-2 At or within 23 feet of present river level; from 110 to 140 feet (33 to 43 m) above river level in southwestern quarter of quadrangle

WT-4 Approximately 100 feet above terrace WT-2 south of Signal Mountain

DESCRIPTION OF MAP UNITS

Holocene surficial deposits

Qc — **Colluvium —** Silt- to boulder-sized fragments derived from underlying and adjacent units. Locally includes glacial drift

Qfp — **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

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

Ql — **Loess—** Light-gray, structureless, homogeneous; wind-deposited silt. Gastropods from several localities in adjoining quadrangles

Qf — **Alluvial-fan deposits (including rock glaciers)—** Fan-shaped, crudely stratified deposits of water-laid gravel, sand, silt, and clay spread outward from mouths of ravines and canyons; show linear sorting along distributaries; finer grained debris becomes progressively more abundant toward downstream margins of fans. Along Spread Creek includes fan deposits composed of white ash, silt, clay, and sand derived largely from Colter and Teewinot Formations (Love, Reed, and Christiansen, 1992)

Qag — **Gravel deposits—** Gravel deposited along flood channelways of major streams; composed chiefly of quartzite roundstones

Qls — **Landslide debris—** Chaotically mixed boulders and finer rock debris emplaced by mass movement

Qlsy — **Youngest landslide debris, in places still actively moving**

Qtg — **Terrace gravel—** Predominantly gravel of rounded quartzite fragments deposited by meltwater from adjacent glaciers

Qwl — **White lacustrine deposits—** Thinly laminated white marl, ash, and clay. May have accumulated in kettles. Mollusk shell material from marl in SE section 32, T45N, R114W, yield 14C age dates of 9580 ± 250 years before present and 8800 ±250 years before present, respectively, from two localities (Meyer Rubin, in Love, 1956, p. 150)

Qslt — **Silt deposits**

Qwf — **White tuff—** Fan deposit of white tuff in vicinity of Triangle X Ranch, sections 17, 18, 19, and 20, T44N, R114W

Qog — **Silt and gravel deposits**

Qlk — **Knob-and-kettle topography on Jackson Lake moraine—** Abundant irregular closed depressions left by melting of local ice masses buried in outwash deposits from the Jackson Lake moraine

Qlo — **Jackson Lake outwash—** Gravel deposits downstream from Jackson Lake moraine (part of third or Pinedale major glaciation); forms terraces graded to Jackson lake moraine

Qlm — **Jackson Lake moraine—** Part of third (Pinedale) glaciation. Till that is part of the Jackson Lake moraine or that accumulated nearby at the same time; composed largely of locally derived rock fragments. Occurs south and east of Jackson Lake; derived from glacial ice from Teton Range and Yellowstone National Park. Slightly younger than Burned Ridge moraine

Qbrk — **Knob-and-kettle topography on Burned Ridge moraine—** Abundant irregular closed depressions left by melting of local ice masses buried in outwash deposits from the Burned Ridge moraine

Qbro — **Burned Ridge outwash—** Gravel deposits downstream from Burned Ridge moraine (part of third or Pinedale major glaciation); forms terraces graded to Burned Ridge moraine

Qbrm — **Burned Ridge moraine—** Part of third (Pinedale) glaciation. Chiefly: a mixture of quartzite clasts and Cretaceous sands and claystone fragments? Extends across the floor of Jackson Hole south of Jackson Lake. Slightly older than Jackson Lake moraine, although recessional deposits may be the same age. Northeastern and eastern source contributed finer debris that resulted in more subdued topography than that of the Jackson Lake moraine

Qg^3 — **Glacial debris of third (and youngest) (Pinedale) major glaciation—**Morainal debris has rough, unmodified surface topography, little weathering of rock fragments, and sparse soil development

Qg — **Glacial drift (Pleistocene)—** glacial debris deposited by westward moving ice; has more subdued topography and is probably older than drift of third (Qg3) glaciation. Occurs on this quadrangle only on the north side of Spread Creek in southeastern part of quadrangle

Qg^2 — **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; capped by loess in many places. May include slightly younger morainal debris with subdued surface topography

Tertiary sedimentary rocks

Tkp — **Kilgore Tuff (Pliocene)—** Compound cooling unit of ash-flow tuff. Gray to brown generally densely welded and devitrified but locally glassy or partly welded. Most parts contain abundant phenocrysts of quartz, sanidine, and sodic plagioclase; sparse opaque oxides, clinopyroxene, and fayalitic olivine. Thickness 100 feet (33 m)

Tg^1 — **Glacial debris (till) of oldest (first) major glaciation (Pliocene)—** Unstratified, unsized, and unsorted gray till-like gravel; composed chiefly of angular fragments of Paleozoic rocks and rounded quartzite clasts; contains striated and soled quartzite boulders in a noncalcareous matrix (Love, 1999). Lies between Huckleberry Ridge and Kilgore Tuffs. Thickness 300 to 450 feet (99 to 137 m)

Tk — **Kilgore Tuff (Pliocene)—** Pale lavender crystal-poor slabby hard rhyolitic welded tuff; black vitrophyric welded tuff at base (where exposed on Two Ocean Lake Quadrangle to the north). Exposed on north and east sides of Signal Mountain. Potassium-argon (K-Ar) age date on Two Ocean Lake Quadrangle of 5.57±0.19 Ma (millions of years before present (Morgan and McIntosh, in press). Previously mapped as Conant Creek Tuff

Tg — **Unnamed gravel—** below Kilgore Tuff and above Teewinot Formation, exposed on northeastern side of Signal Mountain; thickness 1000 to 1200 feet (305 to 366 m)

Tc — **Colter Formation (middle and lower Miocene)—** Light-gray, green, and brown tuff, sandstone, ash, and mafic volcanic conglomerate. Thickness 1400 feet (427 m)

Tte — **Teewinot Formation (Miocene)—** Limestone, claystone, and pumicite, chalky white to light-gray, soft, porous; lower two-thirds is chiefly nodular porous limestone in beds 100 to 200 feet (30 to 60 m) thick interbedded with pumicite in beds 20 to 75 feet (6 to 23 m) thick. Upper part is very fossiliferous thin-bedded claystone, marlstone, and tuff. Thickness more than 6000 feet (1829 m); age in lower part about 10 Ma in upper part 7.5 Ma

Thp — **Hominy Peak Formation (Eocene)(Absaroka Volcanic Supergroup)—** Brown to dull-green andesitic mudflow breccia, vent breccia, conglomerate, and sandstone; light-gray tuff and thin claystone zones near top and at base; lenses of gold-bearing quartzite boulder conglomerate in lower part; fossil trees common. K-Ar age date from basalt (USGS sample DKA2982) from Grand View Point on Two Ocean Lake Quadrangle was 48.6±0.7 Ma (Love and others, 1992). Thickness as much as 2000 feet (610 m) within Teton-Jackson Hole area

Tkp — **Pinyon Conglomerate (Paleocene and Upper Cretaceous)—** Rusty brown conglomerate composed of quartzite roundstones in matrix of rusty coarse-grained sandstone that contains tiny flakes of gold, sporadic boulders of older conglomerate and quartzite 5 to 8 feet in diameter. Thickness 0 to 3800 feet (0 to 1158 m)

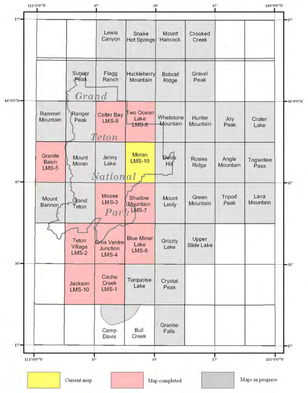
Kme — **Meeteetse Formation (Upper Cretaceous)—** Sandstone, chalky white to rusty brown, white and yellow tuff and bentonite, plastic carbonaceous black shale, and quartzite pebble conglomerates containing small sparse gold flakes; largely or entirely nonmarine. Open circles indicate conglomerate beds. K-Ar age date from white biotite-rich tuff along outlet channel ??? of Emma Matilda Lake is 73.1±0.7 Ma (Love and others, 1992). Thickness 500 feet (152 m) or more

Kmv — **Mesaverde Formation (Upper Cretaceous)—** Sandstone, gray to rusty brown, massive to thick-bedded, and dark-gray carbonaceous shale and siltstone; sparse thin coal beds; largely nonmarine. Thickness 800 feet (243 m) or more

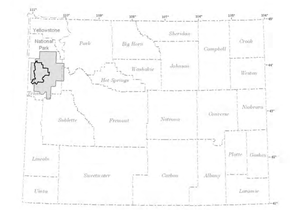
Ks — **Sohare Formation (Upper Cretaceous)—** Sandstone, gray and brown, fine-grained, interbedded with light- and dark-gray shale and siltstone; largely nonmarine; contains coal beds. Thickness more than 2000 (610 m)

Kb — **Bacon Ridge Sandstone (Upper Cretaceous)—** Sandstone, tan to gray, thick-bedded, fine-grained except for quartzite pebble zone near base; interbedded with gray and black shale; several coal and bentonite beds in lower part; abundant marine fossils. ??Thickness about 1000 feet (305 m)

Mdmd — **Madison Limestone and Darby Formation Madison Limestone (Upper and Lower Mississippian and Upper and Middle Devonian)—** Madison Limestone is blue-gray, hard, porous, cavernous in part, marine; zone of red shale, sandstone, and limestone 50 to 100 feet (15 to 30 m) thick at top. Thickness about 1100 feet (335 m). Darby Formation is dolomite, dark-gray to brown, fetid, hard, and yellow, brown, and black shale; thin sandstone interbeds; marine. Thickness about 250 feet (76 m)



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



GENERAL LOCATION MAP
Shaded area indicates Love Map Series; dark outline is boundary of Grand Teton National Park

REFERENCES

Good, J.M. and Pierce, K.L., 1996, Interpreting the landscapes of Grand Teton and Yellowstone National Parks, Recent and ongoing geology: Grand Teton Natural History Association, Moose, Wyoming, 58 p.

Love, J.D., 1956, Summary of geologic history of Teton County, Wyoming, during Late Cretaceous, Tertiary, and Quaternary times: Wyoming Geological Association Eleventh Annual Field Conference Guidebook, p. 140-150.

Love, J.D., 1975, Geologic map of the Whetstone Mountain Quadrangle, Teton County, Wyoming: U.S. Geological Survey Open-File Report 75-138, scale 1:24,000.

Love, J.D., 1989, Names and descriptions of new and reclassified formations in northwestern Wyoming: U.S. Geological Survey Professional Paper 932-C, 45 p., (see map, Figure 24, p. C39).

Love, J.D., 2001, Geologic map of the Shadow Mountain Quadrangle, Teton County, Wyoming: Wyoming State Geological Survey J. David Love Geologic Map Series Map LMS-7, scale 1:24,000.

Love, J.D., 2002, Geologic map of the Two Ocean Lake Quadrangle, Teton County, Wyoming: Wyoming State Geological Survey J. David Love Geologic Map Series Map LMS-8, scale 1:24,000.

Love, J.D., 2003, Geologic map of the Colter Bay Quadrangle, Teton County, Wyoming: Wyoming State Geological Survey J. David Love Geologic Map Series Map LMS-10, scale 1:24,000.

Love, J.D., 2003, Geologic map of the Jenny Lake Quadrangle, Teton County, Wyoming: Wyoming State Geological scale 1:24,000. Survey J. David Love Geologic Map Series Map LMS-12,

Love, J.D., and Love, J.M., 1997, Geologic road log, Jackson to Dinwoody and return: Wyoming State Geological Survey Public Information Circular 20, 38 p.

Love, J.D., and Reed, J.C., Jr., 2001, Geologic map of the Moose Quadrangle, Teton County, Wyoming: Wyoming State Geological Survey J. David Love Geologic Map Series Map LMS-3, scale 1:24,000.

Love, J.D., Reed, J.C., Jr., and Christiansen, A.C., 1992, Geologic map of Grand Teton National Park, Teton County, Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-2031, scale 1:62,500.

Love, J.D., Reed, J.C., Jr., and Pierce, K.L., 2003, Creation of the Teton landscape—A geologic chronicle of Jackson Hole and the Teton Range: Grand Teton Natural History Association, Moose, Wyoming, 131 p.

Morgan, L.H., and McIntosh, W.C., in press, ^{40}Ar-^{39}Ar ages of silicic volcanic rocks in the Hiese Volcanic Field, eastern snake River Plain, Idaho: Timing of volcanism and tectonism , *in* Tectonic and magmatic evolution of the Snake River Plain Volcanic Province: Idaho Geological Survey Bulletin 30.

Pierce, K.L., and Good, J.M., 1992, Field guide to the Quaternary geology of Jackson Hole, Wyoming: U.S. Geological Survey Open-File Report 92-504, 54 p.