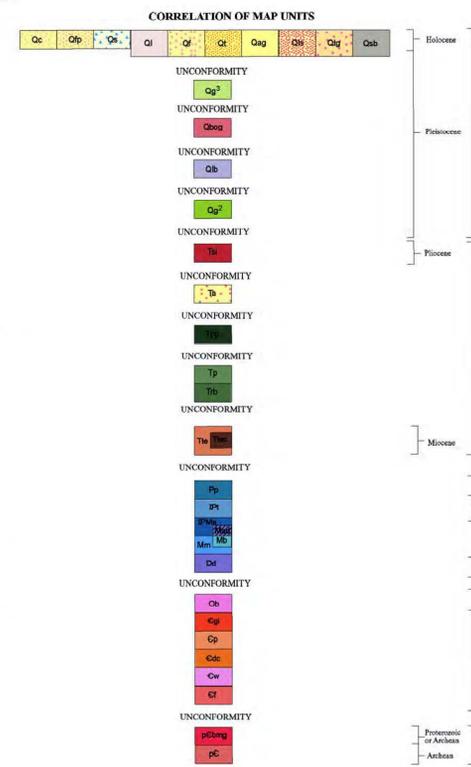
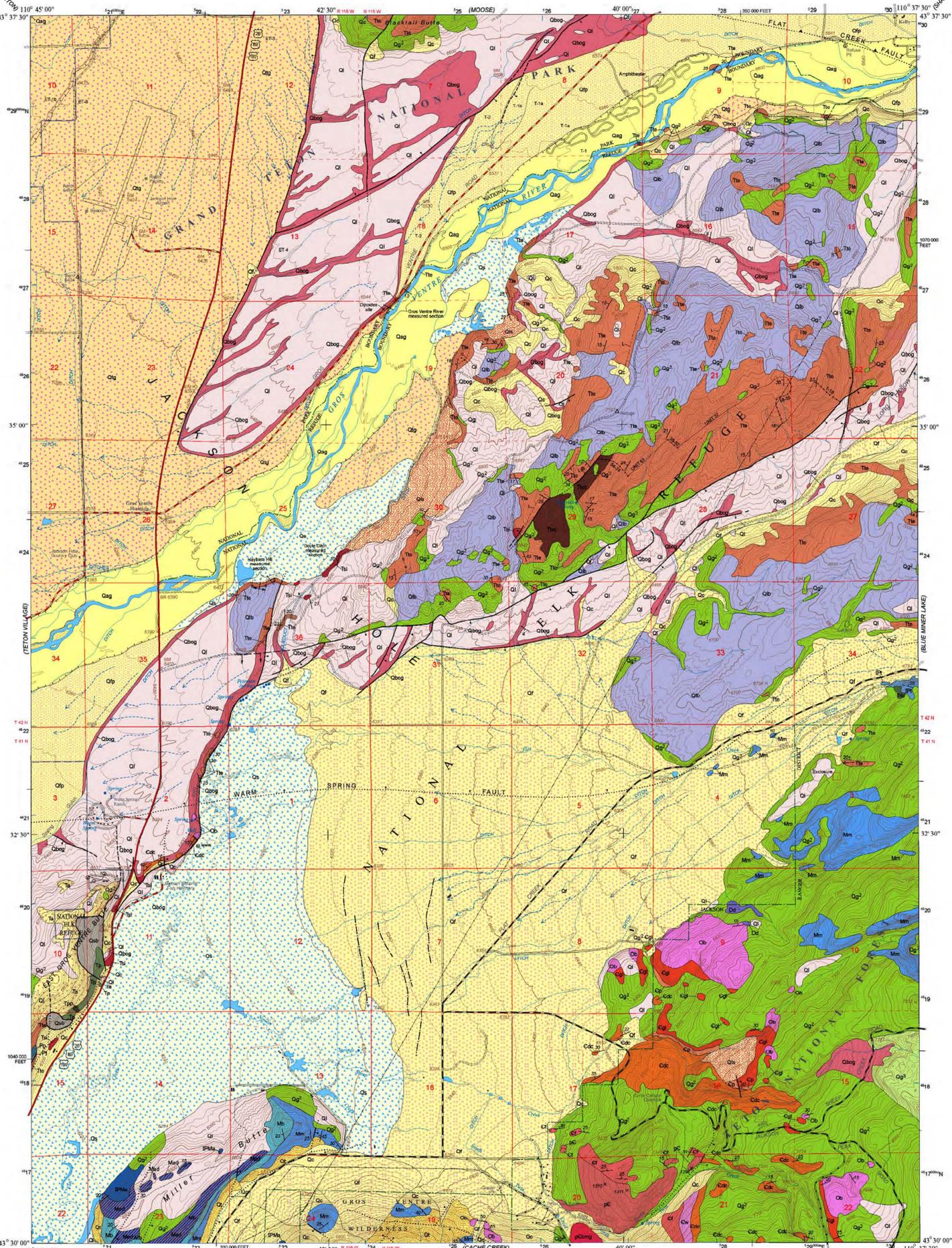




Geology - Interpreting the past  
to provide for the future



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**DESCRIPTION OF MAP UNITS**

**Holocene surficial deposits**

- Qc **Colluvium** - Slope wash of silt- to boulder-sized fragments derived from underlying and adjacent units
- Qp **Flood-plain deposits** - Sand, silt, and clay; lesser amount of gravel at surface distinguishes these deposits from deposits along topographically lower stream valleys
- Qs **Swamp deposits** - Clay, silt, and fine sand, dark-gray and brown, rich in vegetal debris

**Holocene and Pleistocene surficial deposits**

- Qi **Loess** - Light gray, structureless homogeneous wind-deposited silt. Gastropods from several localities have a C<sup>14</sup> age ranging from 13,000 to 19,000 years before present
- Qf **Alluvial fan deposits** - Crudely stratified gravel, sand, silt, and clay spread outward from mouths of ravines and canyons; shows linear sorting along distributaries; finer grained debris becomes progressively more abundant toward downstream margins of fans. Dotted lines indicate margins of individual fans
- Qg **Talus** - Locally derived coarse, angular rock fragments that accumulated on steep slopes and at the base of cliffs
- Qa **Gravel deposits** - Gravel deposited along flood channels of major streams; composed chiefly of quartzite roundstones
- Qb **Landslide debris** - Chaotically mixed boulders and finer grained rock debris emplaced by mass movement
- Qd **Terrace gravel** - Predominantly rounded quartzite gravel deposited by meltwater from adjacent glaciers; includes several mappable terrace morphologic units related to specific river systems
- Qe **Slump blocks** - Coherent masses of bedrock that have moved downslope

**Pleistocene surficial deposits**

- Qg<sup>3</sup> **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
- Qobg **Outwash gravel deposits from second (Bull Lake) major glaciation** - Gravel of quartzite roundstones, crudely stratified; top surface characteristically planar
- Qib **Loess and boulders** - Chalky white formless unstratified deposits consisting of glacial erratics of many sizes and compositions derived from deposits of second major glacial stage; erratics are embedded in a lime-rich white loess matrix; confined to higher hills in the National Elk Refuge
- Qg<sup>2</sup> **Glacial debris of second (Bull Lake) major glaciation** - very old formless piles of erratics and lag deposits of large and small erratics, in places mixed with outwash gravel, sand, and silt; most erratics are not locally derived. May include slightly younger morainal debris with subdued surface topography; capped by loess and soil in most places

**Tertiary sedimentary and volcanic rocks**

- Ta **Shooting Iron Formation (Pliocene)** - Pink, red, green, yellow, dark-gray, and brown bentonitic mollusk bearing claystone, gray and yellow tuffaceous sandstone, and pebble conglomerate of volcanic rock fragments in bentonite matrix. Mollusks indicate local deep-water environment of deposition. Maximum thickness 100 feet (30 m)
- Tc **Rhyolite** - Brown to black, coarsely porphyritic; chiefly flows and intrusive masses. Thickness at least 500 feet (152 m)
- Tp **Obsidian pipe** - Black obsidian breccia capped by jet black perlite
- Tb **Pumice breccia and sandstone** - Pumice breccia, pale-pink and white, composed of frothy pumice clasts and black obsidian in a soft massive shaly matrix, underlain by gray tuff and sandstone, in part very limy. Thickness about 120 feet (37 m)
- Tn **Basalt** - Dark-green to red, dense to vesicular, hard; intruded into Tewnint Formation directly east of quadrangle boundary but overlying Pennsylvanian rocks within quadrangle
- Te **Tewnint Formation (Upper 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 (1800 m); age in lower part about 10 MA (Mega-Annum or million years ago); upper part 7.5 MA
- Tm **Limestone, quartzite, and obsidian pebble conglomerate** - In middle part of formation; 110 feet (33 m) thick
- Tp<sup>1</sup> **Phosphoria Formation (Permian)** - Dolomite, chert, phosphorite, and black shale. Dolomite and chert are dark gray to brown, sandy, chiefly in upper part; phosphorite and black shale in middle and lower parts. Thickness 180 feet (55 m)
- Tp<sup>2</sup> **Tensleep Sandstone (Pennsylvanian)** - Sandstone, light gray, weathering yellowish brown, fine-grained, hard, brittle, quartzite in some zones. Middle and lower parts contain many beds of gray fine-grained limestone and dolomite. Contact with underlying Amnden Formation transitional. Thickness about 450 feet (140 m)
- Tp<sup>3</sup> **Amnden Formation (Pennsylvanian and Mississippian)** - Shale and siltstone, brick-red, red-brown, and green interbedded with white dolomite and limestone. Several zones contain ocher-colored and camelian-red chert nodules. Thickness, exclusive of Darwin Sandstone Member, about 450 feet (140 m)
- Tp<sup>4</sup> **Darwin Sandstone Member (Upper Mississippian)** - Gray to brownish-pink fine- to medium-grained sandstone with some large rounded frosted quartz grains; cross-bedded, moderately soft and porous, red shale partings near top. Thickness about 75 to 100 feet (23 to 30 m)
- Mn **Madison Limestone (Upper and Lower Mississippian)** - Limestone, light- to dark-gray, thick-bedded to massive in part, thin-bedded and dolomitic in part, especially near base. Abundant horn corals occur in more massive beds. Many layers contain black chert nodules. Thickness about 1100 feet (335 m)
- Mb **Bull Ridge Member (Upper Mississippian)** - Shale and siltstone interbedded with orange-red to tan sandstone, tan to pink dolomite, and blue-gray ledge-forming limestone that contains distinctive red and "zebra-striped" gray and black chert nodules. Thickness 50 to 100 feet (15 to 30 m). Has previously been included in the upper part of the Mission Canyon Limestone, in the upper member of the Madison Limestone, or mapped as all or part of the Brazier Limestone, "strawberry beds," or basal part of the Amnden Formation
- Dd **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 300 feet (91 m)
- Ob **Bighorn Dolomite (Upper Ordovician)** - Dolomite, light- and dark-gray, mottled, siliceous; forms ragged gray cliffs. Leigh Dolomite Member about 50 feet (15 m) thick forms slope at top and consists of chalky white very fine-grained brittle dolomite. Thickness about 200 feet (60 m)
- Qg<sup>1</sup> **Gallatin Limestone (Upper Cambrian)** - Limestone, dark-gray, weathers tan, mottled, hard; forms cliffs; upper middle part has 35 feet (11 m) of limy shale; lower part contains flat-pebble "edgewise" conglomerate of limestone fragments. Thickness about 240 feet (70 m)
- Cp **Park Shale (Middle Cambrian)** - Shale, dark green to drab, soft, flakey; many interbeds of soft limestone and sandstone in lower part; several zones of algal heads. Thickness about 300 feet (90 m)
- Cdc **Death Canyon Limestone (Middle Cambrian)** - Limestone, blue-gray, with brown mottling, hard, fine-grained, dense, thin-bedded; crops out in cliffs; middle part contains 30 feet (9 m) of flakey green shale containing abundant trilobites. Thickness 370 feet (113 m)
- Cw **Wolsey Shale (Middle Cambrian)** - Shale, green, flakey, micaceous, soft; more silty and sandy near base. Thickness about 100 feet (30 m)
- Ct **Flathead Sandstone (Middle Cambrian)** - Sandstone, conglomerate, and orthoquartzite, dull reddish-brown to gray, hard; rock fragments in conglomerate are chiefly of locally-derived quartz clasts. Thickness about 290 feet (90 m)

**Precambrian rocks**

- pCmg **Biotite-muscovite granite (Precambrian)** - Gray medium-grained equigranular to porphyritic rock composed of quartz, plagioclase, microcline biotite, and muscovite. May be equivalent to Mount Owen Quartz Monzonite in Teton Range
- pC **Precambrian rocks, undivided (Precambrian)** - complexly interlayered biotite gneiss, quartz plagioclase gneiss, amphibolite, and gray and pink granite cut by quartz dikes

**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
- Probable Holocene fault - Direction of movement not known
- Anticline - Showing crestline. Dotted where concealed or inferred
- Monoclinial flexure
- Strike and dip of beds
- Inclined
- Horizontal

**Other Features**

- Location of measured and sampled section - dotted where offset. In places where outcrops are too narrow to show symbols, area measured is bracketed. Unit numbers are shown in some sections
- Mappable bed of limestone in Tewnint Formation
- Scales (fossil gastropod operculum) marker bed in Tewnint Formation
- Obsidian grit marker bed
- Selected stream channelway - many have been beheaded by faulting or were abandoned because of subsequent drainage changes
- Site of vertebrate fossils of late Miocene age
- Natural salt lick used chiefly by elk
- J.C. Reed, Jr. station in Precambrian rocks

**Wells**

- Water well
- Warm water well

**Terrace sequence** - Dots mark outer boundary of terrace surface except where terrace marks contact between two mappable units; in these places the contact is shown as solid line with hachures on downslope side. Solid hachured lines within a mappable unit depict terrace margins; hachures on downslope side; T-1 or ET-1b is the youngest, T-2 or ET-2 is oldest. Scale of the map precludes showing terrace details

**Terraces related to Gros Ventre River:**

- At and within 10 feet (3 m) of present stream level
- T-1a 5 feet (1.5 m) above terrace T-1
- T-1b 7 feet (2.1 m) above terrace T-1a
- T-2 5 feet (1.5 m) above terrace T-1b

**Terraces related to Snake River - (ET-4 is probably related to both the Snake and Gros Ventre rivers):**

- ET-1b 10 feet (3 m) above Snake River flood channelways
- ET-3 40 feet (12.2 m) above ET-2 is not recognizable in this quadrangle
- ET-4 Approximately 100 feet (30 m) above ET-1b (ET-3 but about half of that amount may be the result of fault displacement which dropped the ET-3 surface

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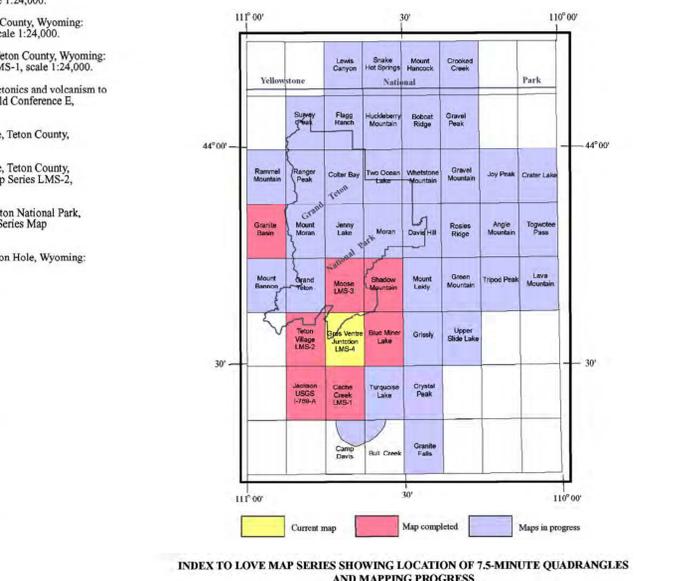
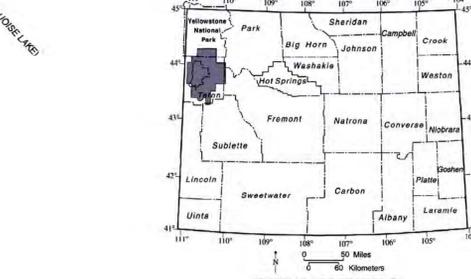
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North American Datum (NAD27). Projection 10,000-foot grid ticks: Wyoming coordinate system, west zone (Lambert conformal conic). Blue 1000-meter Universal Transverse Mercator ticks, zone 12

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

UTM GRID AND 1987 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET (MAGNITUDE IS APPROXIMATE)

SCALE 1:24,000

CONTOUR INTERVAL 40 FEET  
SUPPLEMENTARY CONTOUR INTERVAL 30 FEET

WYOMING

QUADRANGLE LOCATION

Geology by J.D. Love, 1955-73; J.C. Reed Jr., 1970, and John Montagne, 1955  
Digital cartography by Phyllis A. Rantz

**GEOLOGIC MAP OF THE GROS VENTRE JUNCTION QUADRANGLE, TETON COUNTY, WYOMING**  
by  
J. David Love  
2001