SURFICIAL AND BEDROCK GEOLOGIC MAP OF THE DIXON MOUNTAIN 7.5' QUADRANGLE, SOUTHWEST MONTANA

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Introduction

Field work for this map was completed during the summer of 2001, within the Tendoy Mountains, Beaverhead County, southwest Montana. The area covered by the Dixon Mountain 7.5' quadrangle includes a wide variety of rocks and geologic structures, with exposures that display Sevier-style structural deformation, Tertiary volcanism and basin development, and Holocene normal faulting. The central portion of the map area is dominated by outcrops of complexly deformed Paleozoic through Mesozoic marine units within the Tendoy, Deadwood Gulch, and Four Eyes Canyon thrust sheets, all interpreted to have been emplaced during Sevier deformation (Scholten and others, 1955; Klecker, 1980; Ponton, 1983; Skipp, 1988; McDowell, 1997; Lonn and others 2000). The western portion of the map is dominated by exposures of Tertiary sedimentary basin-fill units within the Muddy Creek Graben as well as similarly aged extrusive units (Dunlap, 1982; Janecke, 1999). The northeast corner of the map area contains a short strike length of the active Red Rock normal fault that bounds the Tendoy Mountains to the east (Greenwell, 1997).

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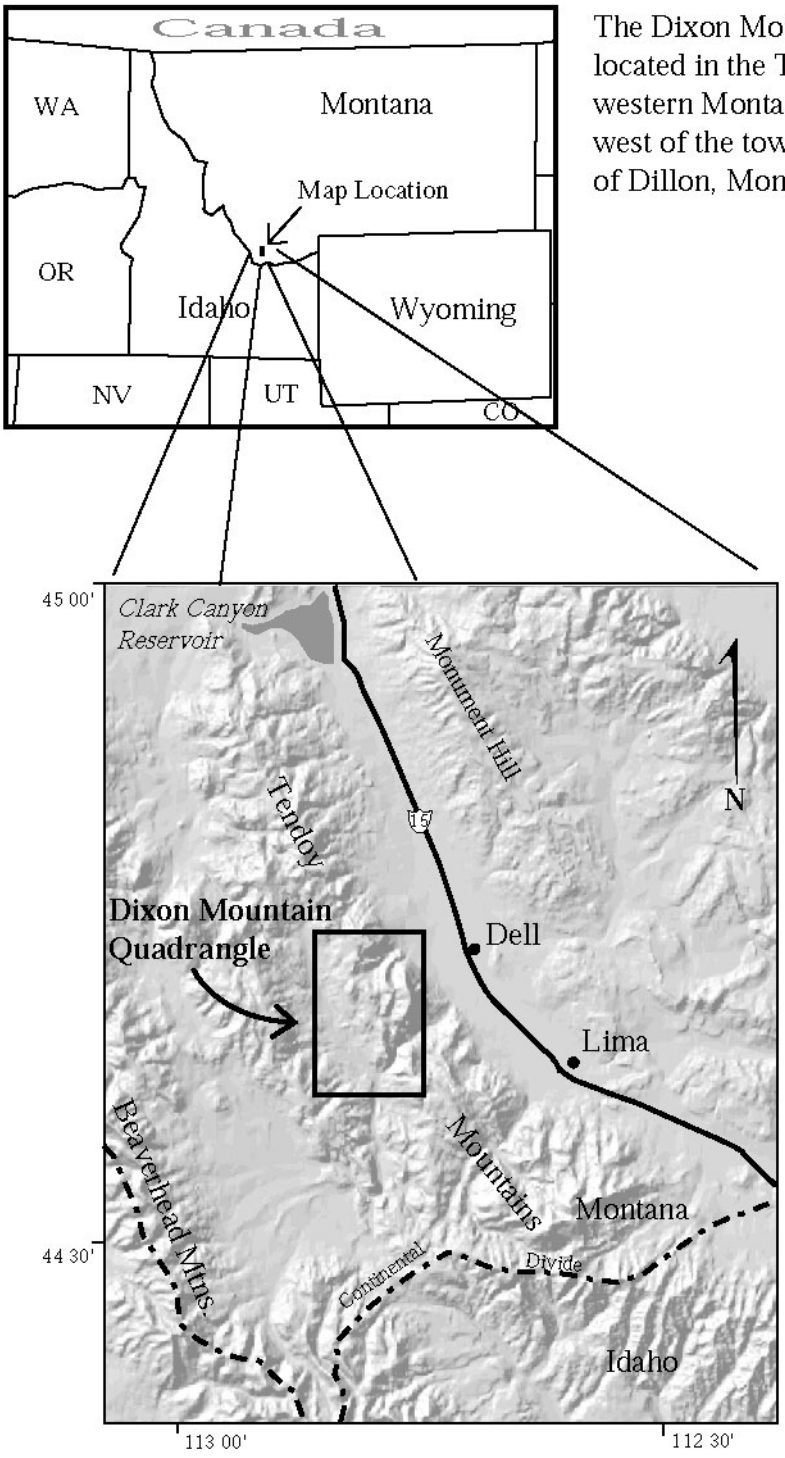
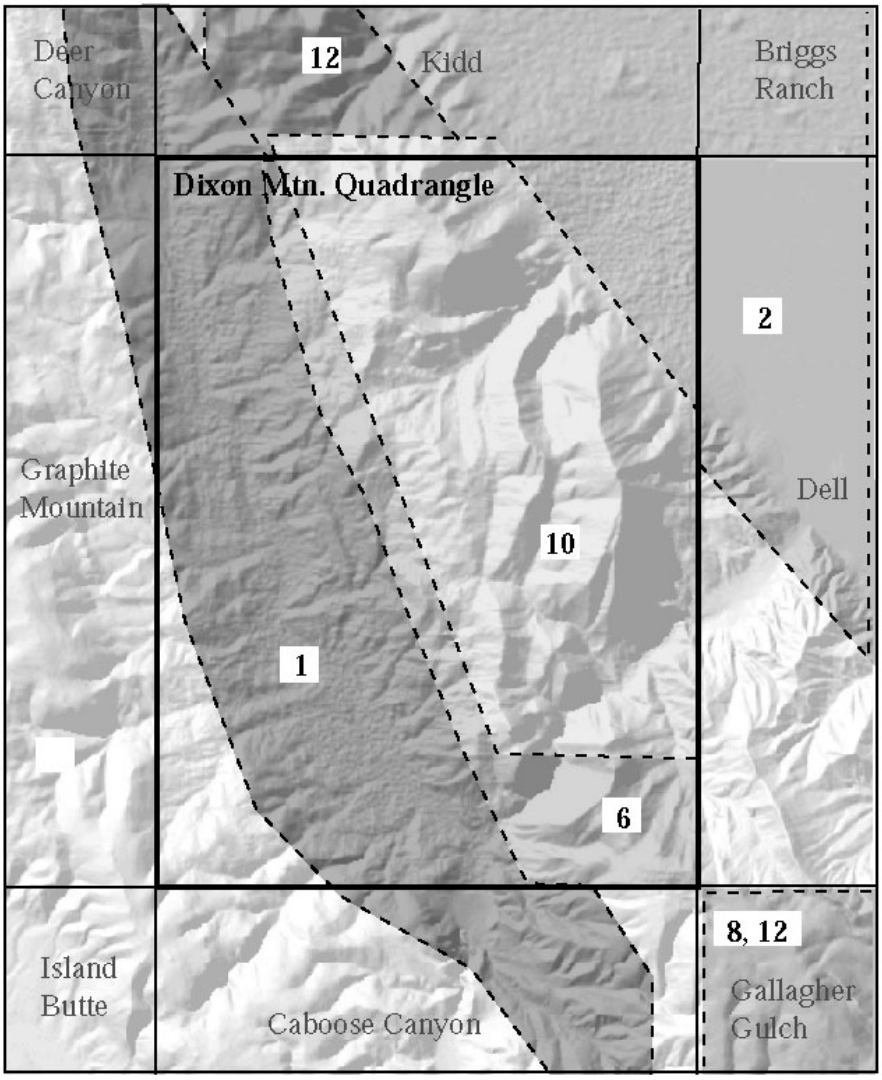
Map Location



The Dixon Mountain 7.5' quadrangle is located in the Tendoy Mountains of southwestern Montana, approximately 3 miles west of the town of Dell and 40 miles south of Dillon, Montana.

Previously published mapping within the Dixon Mountain quadrangle

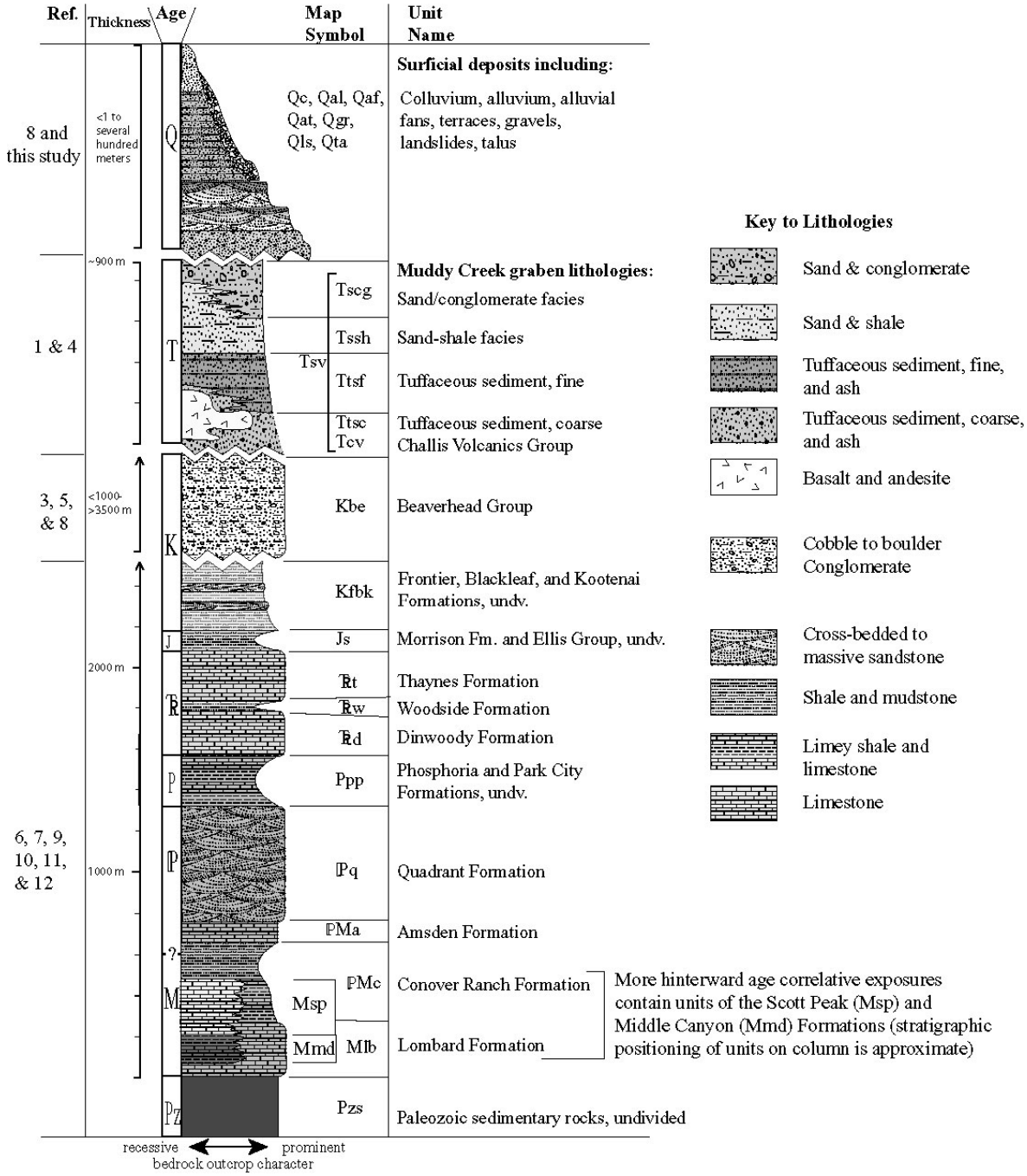


Mapped areas referred to during field work and drafting of the Dixon Mountain 7.5' quadrangle are outlined, references are numbered and keyed to the stratigraphic column on page 4. Mapping within references 3, 4, and 7, which cover the entire display area, was also referred to. Adjacent quadrangle names are also displayed.

Key to references for previous mapping and for units on stratigraphic column (p. 4)

1. Dunlap, 1982
2. Greenwell, 1997
3. Haley, 1986
4. Janecke, 1999
5. Kalakay, 1997
6. Klecker, 1980
7. Lonn and others, 2000
8. McDowell, 1989
9. McDowell, 1997
10. Ponton, 1983
11. Skipp, 1988
12. Williams, 1984

Stratigraphic Column of Mapped Units Within the Dixon Mountain 7.5' Quadrangle



Stratigraphic column of units mapped within the Dixon Mtn. 7.5' quadrangle. Unit thicknesses are all approximate. Compiled from noted references.

Map Unit Descriptions

NOTE: Map unit thicknesses, where given, are in metric units. To convert meters to feet (the contour interval unit on the topographic map base), divide the meters by 0.3048.

Quaternary

Qal — *Alluvium:* Unconsolidated, sorted to poorly sorted deposit of fluvial silt, sand, and gravel, in and at grade with modern stream and channels.

Qaf_1 — *Youngest alluvial fan deposit*: Deposit of unconsolidated, poorly sorted alluvial gravel, sand, and silt, usually fan shaped but sometimes fan heads are channelized and entrenched into older units. Surfaces display characteristic bar and swale morphology.

Qaf_2 — *Older alluvial fan deposit*: Fan-shaped deposit of unconsolidated, poorly sorted alluvial gravel, sand, and silt. Second oldest alluvial fan deposit in the map area. Surfaces display smooth or subdued bar and swale morphology.

Qafo — *Old alluvial fan deposit:* Deposit of unconsolidated boulders, gravel, sand, and silt, usually fan-shaped, often dissected and found several tens of meters higher than adjacent modern alluvium. Relative age uncertain but older than Qaf_2.

Qat_1 — *Youngest terrace deposits:* Deposits of well-sorted, fluvial silt, sand, and gravel with a characteristic flat-topped morphology; multiple surfaces are observed; deposits often well- stratified. Clasts are composed predominantly of locally derived limestone, sandstone, quartzite, and andesite, with lesser amounts of granite and granitic gneiss. Qat_1 is at 1-3 m above modern channels.

Qat_2 — *Second youngest terrace deposits:* Deposits preserved at 5-10 m above modern channels.

Qat_3 — *Oldest terrace deposits:* Generally isolated deposits preserved at 12-15 m above modern channels.

Qls — *Landslide deposits:* Unconsolidated deposits of locally derived, angular, unsorted debris with a characteristic hummocky topography and head scarp.

Qc — *Colluvium:* Thick, unconsolidated, hillslope, talus, and rockfall deposits; contains some alluvium. Grain size ranges from boulder to silt; clasts are often angular to semi-angular.

Qta — *Talus:* Hillslope deposits of unsorted, angular rock fragments.

Qgr — *Gravels:* Isolated, thick deposits of unconsolidated gravels and sands containing rounded clasts of quartzite, sandstone, limestone, and a variety of igneous lithologies.

Tertiary

Tscg — *Sandstone / conglomerate facies:* Conglomerates and sandstones with multiple depositional features including cross bedding, scour fill, and horizontal bedding. Contains cobbles of Tendoy thrust sheet affinity; thickness varies.

Tssh — *Shale / sandstone facies:* Variegated, buff- to rusty-colored sandstones, mudstones, shales, and rare limestones, often thin-bedded and fossiliferous; thickness varies.

Ttsf — *Tuffaceous sediment, fine:* Predominantly buff-colored tuffaceous sandstones and siltstones; some limestones and marls, thinly laminated and usually lacking fossils; significant ash content; thickness varies.

Ttsc — *Tuffaceous sediment, coarse:* Variegated buff- to brown-colored, tuffaceous sediment that retains most of its original pyroclastic character; mostly sandy but conglomeratic in places; thickness varies.

Tcv — *Volcanic rocks of Challis Volcanics Group:* massive basalt and andesite, basaltic agglomerate and rhyolite tuff. Often black, dark-brown, to dark-red in color.

Tsv — *Sediments, sedimentary rock, and volcanic rock, undivided*. On cross sections only.

Cretaceous

Kbe — *Beaverhead Group (as observed at the top of Little Water Canyon):* Reddish-colored conglomerate with clasts ranging from 1 m to sand size; cobbles composed of limestone, chert, sandstone, and quartzite, mostly massive with some finer sand and silt lenses and beds; thickness varies.

Kfbk — *Frontier, Blackleaf, Kootenai Formations, undivided:* Predominantly reddish-colored, thinly bedded sandstone and siltstone; contains “salt and pepper” sandstone beds and lacustrine limestone; cherty conglomerate at base. Thickness greater than 300 m.

Jurassic

Js — *Jurassic sedimentary rocks, undivided (Morrison Formation and Ellis Group):* Nonmarine to marine siltstones, sandstones, calcareous siltstones, and limestones. Seldom outcrop and are never prominent. Thickness 110 m.

Triassic

TRt — *Thaynes Formation:* Marine, light-gray weathering to buff-colored, thin-bedded and laminated, fossiliferous, silty limestone; locally contains black chert; cliff-forming. Thickness 200 m.

TRW — *Woodside Formation:* Rusty- to tan-colored, transitional marine, fenestral silty limestone, calcareous siltstone and sandstones; rarely exposed. Thickness 45 m.

TRd — *Dinwoody Formation:* Marine, dark-rusty to dark-chocolate-brown, thin-bedded calcareous siltstone and fossiliferous silty limestone; cliff-forming. Thickness 260 m.

Permian

Ppp — *Phosphoria and Park City Formations, undivided:* Marine, light-colored phosphatic shale, calcareous siltstone, and sandstone, and fossiliferous limestone. Thickness 190 m.

Pennsylvanian

IPq — *Quadrant Formation:* Buff-colored, cliff-forming, thick-bedded to massive, cross-bedded, calcareous and noncalcareous sandstone. Thickness 470 m.

Pennsylvanian-Mississippian

IPMa — *Amsden Formation:* Light- to dark-gray, brown-weathering, marine, thin-bedded, fossiliferous limestone and calcareous sandstone, with basal limestone conglomerate. Thickness 90 m.

IPMc — *Conover Ranch Formation:* Buff-colored, cross-bedded sandstone, finely inter-bedded sandstone and siltstones, rhythmically bedded black shales, and some light- to dark-gray, thin-bedded, fossiliferous limestone. Thickness approximately 300 m.

Mississippian

Mlb — *Lombard Formation (as observed at Deadwood Gulch):* Light- to dark-gray, thin-bedded, fossiliferous limestones, interbedded with buff-colored, calcareous siltstone. Thickness approximately 210 m.

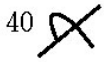
Msp	*Scott Peak Formation:* Light- to medium-gray, thin to massively bedded, cliff-forming, fossiliferous limestone and silty limestone. Abundant chert stringers. Some portions contain abundant bryozoan and crinoid debris and rudist corals. Thickness approximately 390 m.
Mmd	*Middle Canyon Formation*: Medium- to dark-gray, silty limestone and limey mudstone. Chert lenses and pods throughout; unit seldom outcrops predominantly. Extensive deformation within this unit prohibits accurate determination of stratigraphic thickness; approximately 150 m.
Pzs	*Paleozoic sedimentary rocks, undivided:* Paleozoic limestones and marine clastic rocks of unknown formation affinity.

Map Symbols

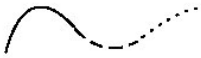
Bedding strike and dip where measured

Horizontal bedding

Vertical bedding



Overturned bedding



Contact; dashed where approximate, dotted where concealed

Facies change in sedimentary rocks (on cross section only)

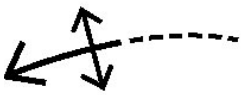
Fault with relative vertical movement indicated where known; dashed where approximate; dotted where concealed.
U= upthrown side, D= downthrown side.

Normal fault; ball and bar on downthrown or hanging-wall side; dashed where approximate; dotted where concealed

Thrust or reverse fault; teeth on hanging-wall side; dashed where approximate; dotted where concealed

Detachment fault, normal sense; symbols on hanging wall; dashed where approximate; dotted where concealed

Strike-slip fault; dashed where approximate; dotted where concealed



Axial trace of anticline showing plunge; dashed where approximate

Axial trace of overturned anticline showing plunge; dashed where approximate

Map and Cross Section Symbols, continued

Axial trace of syncline showing plunge; dashed where approximate

Axial trace of overturned syncline showing plunge; dashed where approximate

Fold train and axial strike

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