

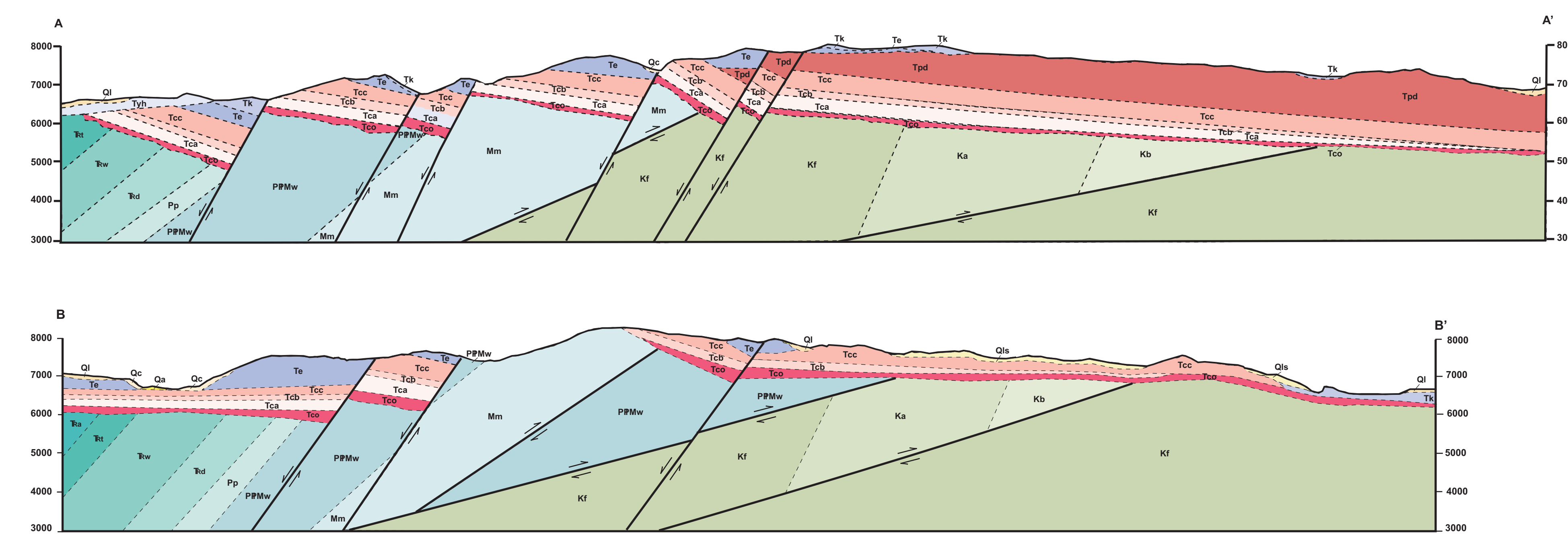
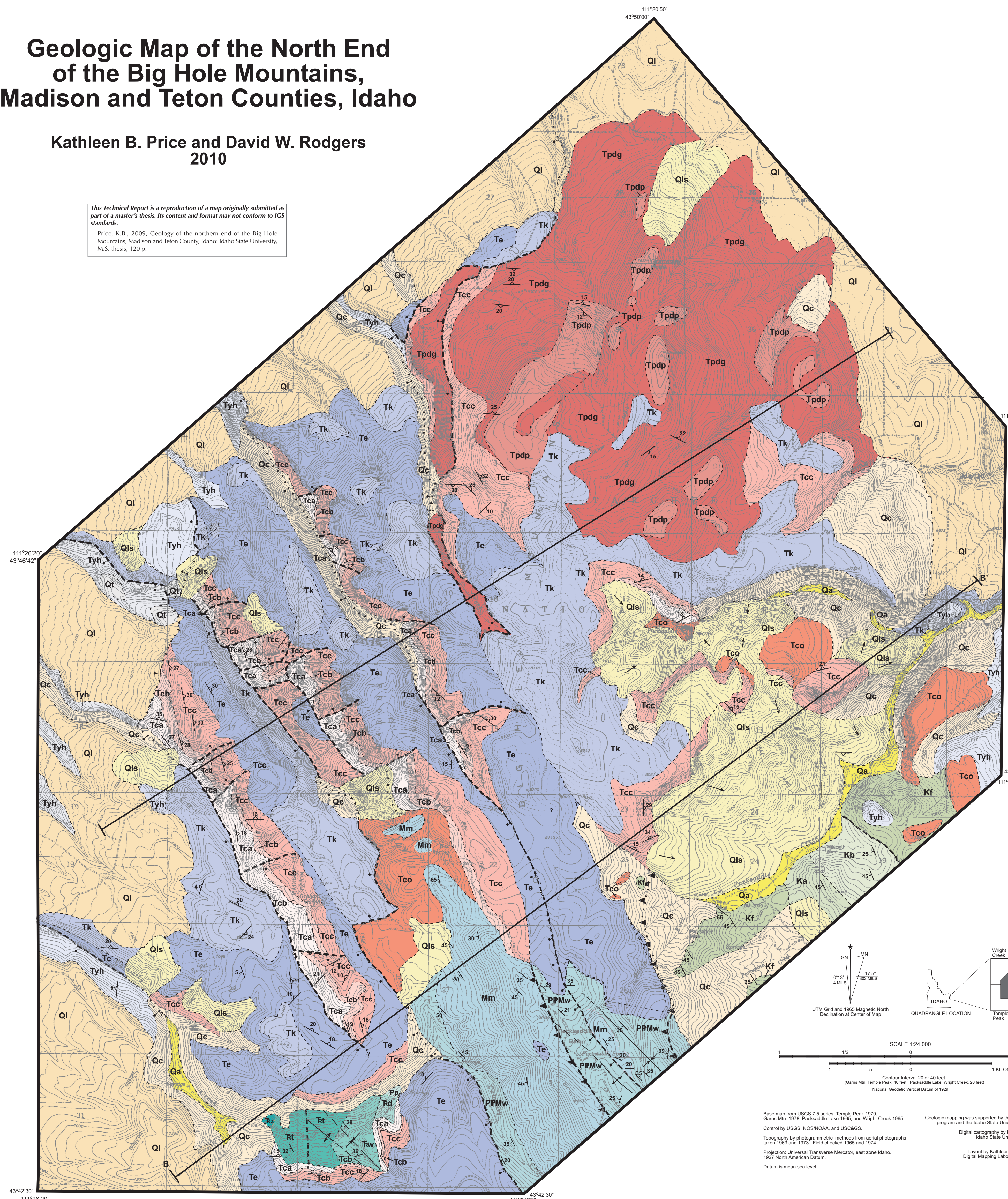
Plate 1, Price, K. B., 2009, M.S. Thesis, Idaho State University. Supported by the U.S. Geological Survey, National Cooperative Geological Mapping Program, under assistance award no. 02HQAG003.

Geologic Map of the North End of the Big Hole Mountains, Madison and Teton Counties, Idaho

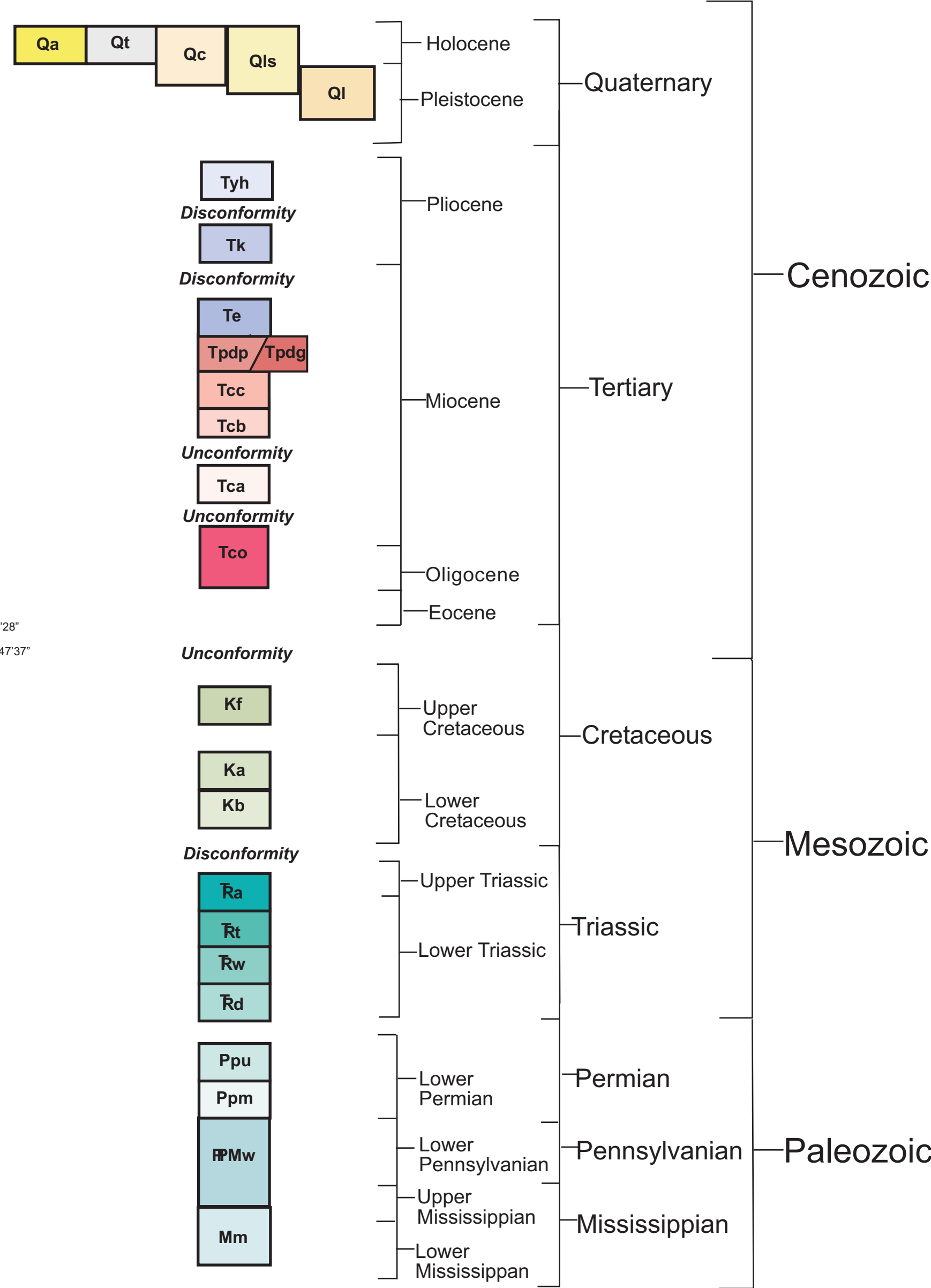
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Price, K.B., 2009, Geology of the northern end of the Big Hole Mountains, Madison and Teton Counties, Idaho: Idaho State University, M.S. thesis, 120 p.



Correlation of Map Units



Description of Map Units

- Qa** Alluvium (Holocene) – Unconsolidated clay, silt, sand, and gravel below modern streams. Thickness is generally less than 15 feet.
- Qt** Travertine (Holocene) – Tan to white, porous, finely layered limestone deposited in small mounds by hydrothermal activity. Thickness is 0-50 feet.
- Qc** Colluvium (Holocene and Pleistocene) – Tan, gray, brown, and red-brown, unconsolidated, angular silt- to boulder-sized debris found on steep slopes and uncommonly on flats. Thickness is 0-25 feet.
- Qls** Landslide deposits (Holocene and Pleistocene) – Chaotically mixed boulder- to silt-sized rock debris. Thickness is 0-50 feet.
- Ql** Loess (Pleistocene) – Light tan to dark brown, homogeneous siltstone deposits of angular silt and clay grains. Composed mostly of calcite and quartz but also contains clay minerals, biotite, muscovite, zircon, feldspar and amphibole. Typically covers slopes below 6500-7000' in elevation. Thickness is 0-40 feet (Staatz and Albee, 1966a).
- Tyh** Huckleberry Ridge Tuff (Pliocene) – Rhyolite ignimbrite. Compound cooling unit of tan, gray and lavender, densely welded, eutaxitic, crystal-rich, devitrified tuff. Contains phenocrysts of 5% quartz, 10% sandstone and 5% sodic plagioclase, sparse opaque oxides (magnetite), clinopyroxene and feldspar. Changes upsection from phenocryst-rich to phenocryst-poor. Welded pumice is dark and scoriaceous or light colored and compact. Weathers into distinctive rectangular blocks of varying sizes. Found on lower elevation slopes in the north and west of map area. Lower contact is an angular unconformity defined by the first appearance of crystal-rich, light-colored tuff. Age is 2.06 Ma (Lanphere et al., 2002). Thickness is 0-200 feet.
- Tk** Tuff of Kilgore (Pliocene) – Rhyolite ignimbrite. Pink to gray, crystal-poor, densely welded tuff. Phenocrysts of plagioclase, quartz, sandstone, augite, magnetite and zircon compose 2-7% of the rock. Diagnostic textures include common lithophysae from 0.1-1.1 inch in diameter, maroon pumice, and black, gray and maroon obsidian pieces from 0.5-4 inches. Forms flattened lithophysae are 3-4 inches in diameter. Forms slopes covered with angular to rounded cobbles and boulders of varying sizes. Lower contact is a disconformity placed below the lowest crystal-poor tuff. Age is 4.49 Ma (Anders et al., 2009). Thickness is 0-100 feet.
- Te** Tuff of Edie School (Upper Miocene) – Rhyolite ignimbrite. Dark gray, violet, or lavender, crystal-rich, densely welded tuff. Contains 10-20% phenocrysts of plagioclase, quartz, sandstone, augite, serpenitized and oxidized pyroxene, magnetite and zircon. Phenocrysts are most abundant in a rare, dark purple to black, devitrified basal zone. Common flattened lithophysae are 3-4 inches in diameter. Forms slopes covered with angular to rounded cobbles and boulders of varying sizes. Fractures into cubical blocks about 1 ft long and is strongly weathered in most places. Lower contact is a disconformity marked by the first appearance of purple, crystal-rich tuff. Age is 6.57 Ma (Anders et al., 2009). Thickness is 0-500 feet.
- Tcc** Carlton Creek Volcanics (Upper Miocene) – Dacite lava flows and ignimbrites. Formerly mapped by Staatz and Albee (1966a, b) as part of the Kirkham Hollow Volcanics, but herein defined as a new formation containing 4 members. Type section is on the northeast slope of Carlton Creek in Sec. 17 & 18, T6N, R4E, W8E, Wright Quadrangle, Madison County, Idaho for Members A, B, and C. Type section for the dacite of Pony Creek is located near the Pony Creek drainage in Sec. 34, T6N, R4E. Thickness at the type locality is approximately 600 feet; elsewhere it ranges from 0-900 feet.
- Tcb** Dacite of Pony Creek (Upper Miocene) – Dacite lava flow. Black to dark gray, massive, vesicular trachytic lava flow with 10% phenocrysts, 2% quartz xenocrysts, 20% vesicles, and 68% aphyritic, microcrystalline matrix. Fine-grained phenocrysts include 70% euhedral to subeuhedral laths of plagioclase, 25% euhedral to anhedral augite, and 5% anhedral hornblende. Vesicles are 0.02-0.1 inches in diameter, aligned, show glass rims, and have rare laths of plagioclase protruding into them. Quartz xenocrysts are about 0.4-2 inches in diameter. Locally divided into two zones based upon textural differences. Lower contact is a disconformity marked by the first appearance of vitrophytic lava. ⁴⁰Ar/³⁹Ar analysis on sandstone indicates an age of 6.59±0.02 Ma. Thickness ranges from 0-1400 feet.
- Tca** Glassy zone, Pony Creek dacite lava flow – Dense, black, and glassy with a conchoidal fracture. Contains zones of intense perlitic texture. Perlitic diameters are generally 0.1-0.2 inches but can be as much as 1 inch. Forms slopes covered with angular to rounded cobbles and boulders and low, rounded ledges.
- Tcd** Platy zone, Pony Creek dacite lava flow – Dense, dark gray, and platy with rare white pumice. Forms steep ledges 3-10 feet high and alternating slopes. Fractures into angular blocks about 3 feet across and 0.5-2 inches thick.
- Tco** Member C, Carlton Creek Volcanics (Upper Miocene) – Dacite ignimbrite. Black to gray, devitrified, crystal-poor, thin-poor welded tuff. The rock contains 2% euhedral, very fine-grained phenocrysts of plagioclase, magnetite, rare pyroxene and zircon. Plagioclase forms laths or stubby tabular crystals. Pyroxene is altered and rimmed with Fe/Ti oxides. The glassy matrix contains microlites of strongly trachytic plagioclase, rare pyroxene and magnetite. Laminated flow planes and prominent jointing parallel to the banding are distinctive. Flow planes are discontinuous and commonly parallel to the ground surface. Dark gray, thin, devitrified layer overlies a red to black, altered, discontinuous flow breccia. Upper half forms cliffs and ledges and the lower half forms a colluvial slope. Lower contact marked by a red to black, altered, flow breccia overlain by a discontinuous, thin, dark gray, devitrified layer. ⁴⁰Ar/³⁹Ar analysis on sandstone indicates an age of 6.62±0.08 Ma. Thickness is approximately 400 feet in the type area but ranges from 0-400 feet in map area.
- Tcb** Member B, Carlton Creek Volcanics (Upper Miocene) – Dacite ignimbrite. Dark gray and red, thinly laminated, crystal-rich, densely welded, rheomorphic tuff. Contains 10-15% phenocrysts of plagioclase, uncomform quartz, Fe/Ti oxides, and rare pyroxene. Flow planes are convolute and relatively continuous. Platy cleavage or jointing is sub-perpendicular to the ground surface. Lower contact is placed above tan pumice and below a rarely exposed red and black flow breccia. Forms slopes and low ledges that weather into small hoodoos. Thickness is generally less than 100 feet.
- Tca** Member A, Carlton Creek Volcanics (Upper Miocene) – Rhyolite lava flow. Gray to lavender with areas of pink and brown, crystal-rich, flow-banded, densely welded lava flow. Contains 15-20% fine-grained phenocrysts of euhedral plagioclase, quartz, sandstone, pyroxene and minor Fe/Ti oxides. Matrix is light colored and glassy. Flow bands are 0.1-1.1 inches thick, continuous, and horizontal to convoluted. Tan to pale yellow pumice is present at top of member. Unconformable lower contact placed at the base of lowest volcanic rock which overlies sedimentary rocks. ⁴⁰Ar/³⁹Ar analysis on groundmass did not yield an interpretable result. Thickness is 0-400 feet.
- Tco** Tertiary conglomerate (Eocene-Miocene) – Cobble conglomerate. Tan to red, fine-grained, calcareous matrix with subangular to rounded clasts of gray and brown limestone, red and yellow siltstone, and uncommon white quartz. Clasts range in size from 0.2 inches to 3 feet, but are typically 0.2-4 inches. Matrix is poorly indurated and weathers easily. Forms smooth slopes. Lower contact is a profound angular unconformity placed below the lowest cobble conglomerate. Thickness is 0-100 feet.
- Kf** Frontier Formation (Upper Cretaceous) – Sandstone. Gray and brown, fine- to coarse-grained sandstone, pebbly and highly glauconitic near top, interbedded with gray and black shale and thin coal beds. Contains lenses of conglomerate throughout the formation; bentonite and white to pink porcellanite beds in lower part. It is easily weathered, friable and covered by colluvium in most places. Forms broad slopes and is poorly indurated in the area. The base is marked by a 50-70 foot, ridge forming, non-calcareous, felted sandstone. Thickness is approximately 4000 feet (Staatz and Albee, 1966a).
- Ka** Aspen Shale (Lower Cretaceous) – Shale and sandstone. Greenish gray to gray rock composed of white quartz and dark gray chert grains. Fine- to medium-grained, poorly sorted, thick-bedded, well cemented and shows minor cross-bedding. A resistant unit forming prominent ledges. Conformable lower contact which is placed at the bottom of a thin (<15 feet) sandstone ledge just beneath the porcellanite layer. Thickness is approximately 2500 feet (Staatz and Albee, 1966a).
- Kb** Bear River Formation (Lower Cretaceous) – Shale, sandstone, limestone, clay and silt. Sandstone is gray with fine-grained white quartz and dark gray chert grains, and is commonly cross-bedded. Generally forms ledges. Shale is greenish gray, light gray and black, carbonaceous with a few thin seams of coal-like material. Other lithologies are generally gray with thin to medium beds. The base of this unit is not exposed here, but in other areas is placed at the bottom of the green-gray sandstone overlying the Cretaceous Droney Limestone (not found in mapped area). Thickness is approximately 900 feet (Staatz and Albee, 1966a).
- Ra** Ankareh Shale (Triassic) – Red to purple calcareous siltstone and shale, has greenish-white polka-dot mottling in several layers. Poorly exposed and commonly covered by red soil. No basal exposure is found here. Thickness is approximately 540 feet (Staatz and Albee, 1966a).
- Rt** Thayne Formation (Triassic) – Limestone and calcareous siltstone. Upper half is gray bioclastic limestone underlain by yellowish-gray limy siltstone and sandstone. Lower half is red siltstone underlain by shaly dark-brown fossiliferous silty limestone. Poorly exposed in the map area and generally covered with tan soil. Lower contact is not exposed. Thickness is approximately 800 feet (Staatz and Albee, 1966a).
- Rr** Woodside Formation (Triassic) – Red-brown siltstone, shale, and fine-grained sandstone. Very poorly exposed and generally covered with red soil. Lower contact is not exposed. Thickness is approximately 350 feet (Staatz and Albee, 1966a).
- Rd** Dinwoody Formation (Triassic) – Brownish-gray to olive-drab, shaly, thin-bedded dolomitic limestone. Contains thin partings of fine-grained dolomitic sandstone and silty limestone. Generally covered with gray soil. Lower contact is not exposed. Thickness is approximately 360 feet (Staatz and Albee, 1966a).
- Pp** Phosphoria Formation and related rocks (Permian) – Black phosphatic shale at top; mudstone, carbonate rock, and sandstone; gray cherty dolomite, mudstone, and sandstone; black phosphorite, mudstone, and shale at base. Weathers tan and is very poorly exposed in the map area. Lower contact is not exposed. Thickness is approximately 300 feet (Staatz and Albee, 1966a).
- PPMw** Wells Formation and associated rocks (Permian, Pennsylvanian, and Upper Mississippian) – Wells Formation is light-gray, fine-grained sandstone and gray limestone beds especially in lower part. In places, uppermost part contains chalky-white, very fine-grained dolomite and gray chert. The Grandeur Member of the Park City Formation is included with this unit. Lower contact is not exposed but to the south is a brown to gray limestone lying on top of the dark gray, Mississippian, Mission Canyon Limestone. Cumulative thickness is approximately 1500 feet (Staatz and Albee, 1966a).
- Mm** Mission Canyon Limestone (Mississippian) – Light- to dark-gray, coarse- to fine-grained limestone with some chocolate brown dolomite. Characterized by breccia beds in the upper half composed of gray, medium-grained, angular limestone and lesser chert fragments in a matrix of silty limestone. The lower half is coarse-grained bioclastic limestone and dolomite interbedded with massive limestone. Lower contact is not exposed. Thickness is greater than 3000 feet (Staatz and Albee, 1966a).

Symbols

- Unit contact, dashed where approximately located, dotted where concealed.
- Normal fault: bar and ball on hanging wall, dashed where approximately located, dotted where concealed.
- Thrust fault: teeth on hanging wall, dashed where approximately located, dotted where concealed.
- Strike and dip of bedding
- Strike and dip of foliation
- Anticline
- Syncline
- Direction of landslide

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