Geologic Map of the Southern Beaverhead Range (Parts of Copper Mountain, Shamrock Gulch, Scott Butte, and Snaky Canyon Quadrangles), Clark, Jefferson, and Lemhi Counties, East-Central Idaho

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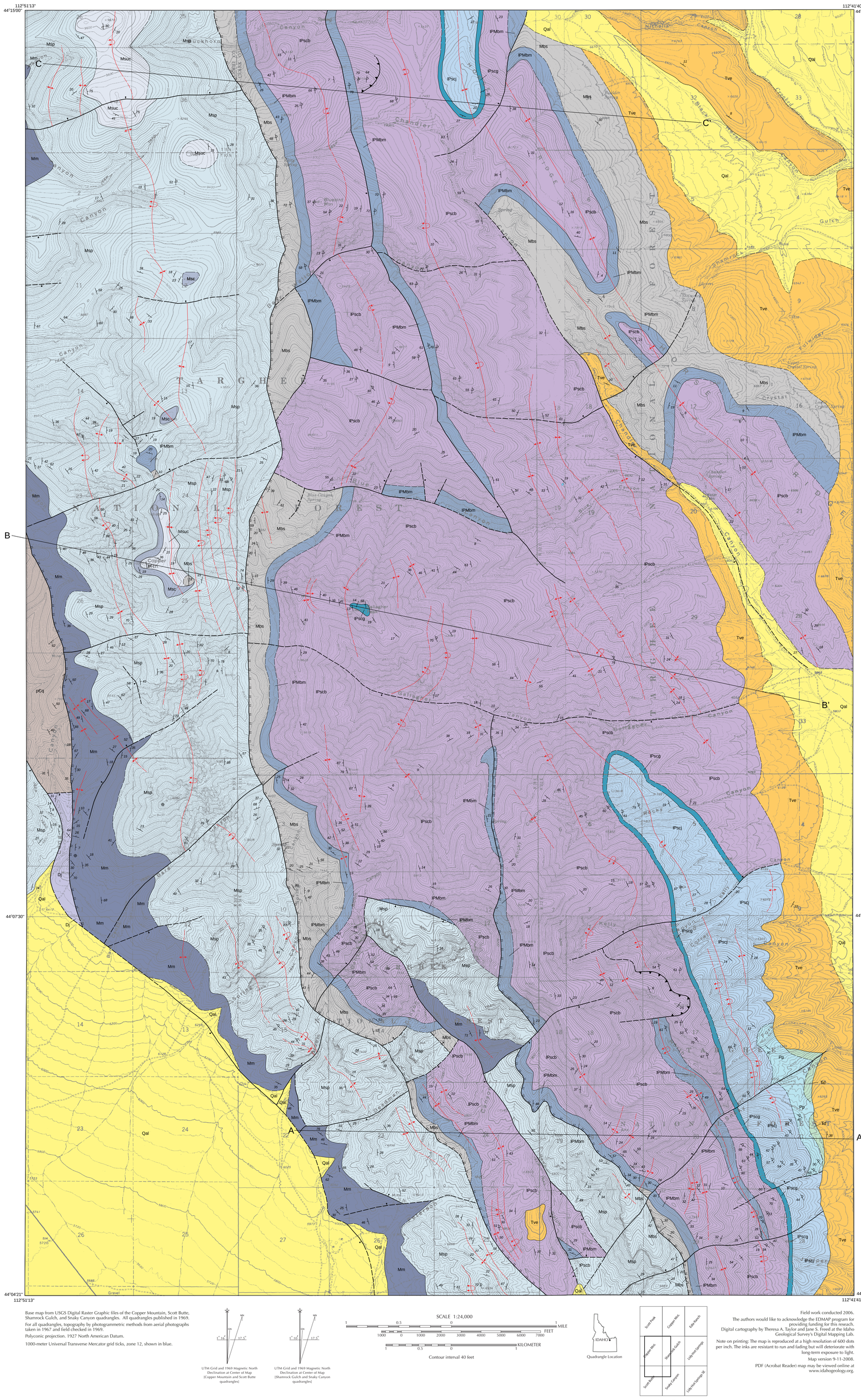
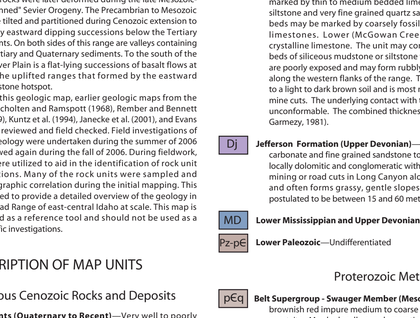


Correlation of Map Units



INTRODUCTION

The geologic map of parts of the Copper Mountain, Scott Butte, Shamrock Gulch, and Snaky Canyon quadrangles indentifies the surficial bedrock and shallow subsurface bedrock within the Beaverhead Range of east-central Idaho. The 50 square mile map area includes the northwest portion of the Snaky Canyon, the western side of the Shamrock Gulch, and the eastern sides of the Copper Mountain and Scott Butte 7.5 minute quadrangles in Clark, Jefferson, and Lemhi counties of east-central Idaho. The southernmost part of the map area, where Skipp et al. (1979) mapped is included in the 1:100,000 scale Geologic Map of the Idaho National Engineering Laboratory and Adjoining Area (Kuntz et al., 1994). The entire map area is covered in the Dubois 30 x 60 minute sheet (Rember and Bennett, 1979). This compilation map indicates the Scholten and Ramspott (1968) geologic map terminates to the north at the Clark County-Lemhi County boundary and that there were no previously detailed published maps within this map area.

The rocks in the Beaverhead Range are oldest in the west and become progressively younger to the east. The oldest rocks in the Beaverhead Range are Precambrian metasedimentary strata that are unconformably overlain by carbonate dominated Paleozoic-Mesozoic sedimentary rocks. The Precambrian-Mesozoic rocks were later deformed during the late Mesozoic-early Cenozoic "thin skinned" Sevier Orogeny. The Precambrian to Mesozoic sedimentary rocks were tilted and partitioned during Cenozoic extension to produce predominantly eastward dipping successions below the Tertiary and Quaternary sediments. On both sides of this range are valleys containing thick successions of Tertiary and Quaternary sediments. To the south of the field area, the Snake River Plain is a flat-lying successions of basalt flows at the southern end of the uplifted ranges that formed by the eastward migration of the Yellowstone hotspot.

For the completion of this geologic map, earlier geologic maps from the surrounding areas by Scholten and Ramspott (1968), Rember and Bennett (1979), Skipp et al. (1979), Kuntz et al. (1994), Janecke et al. (2001), and Evans and Green (2003) were reviewed and field checked. Field investigations of surficial and bedrock geology were undertaken during the summer of 2006 and results were reviewed again during the fall of 2006. During fieldwork, aerial photographs were utilized to aid in the identification of rock unit boundaries and locations. Many of the rock units were sampled and examined for biostratigraphic correlation during the initial mapping. This geologic map is intended to provide a detailed overview of the geology in the southern Beaverhead Range of east-central Idaho at scale. This map is intended to be utilized as a reference tool and should not be used as a substitute for site-specific investigations.

DESCRIPTION OF MAP UNITS

Autochthonous Cenozoic Rocks and Deposits

Qal **Unconsolidated Sediments (Quaternary to Recent)**—Very well to poorly sorted unconsolidated clays to gravels representing alluvium, landslide debris, talus, floodplain deposits, and fanglomerates.

Cenozoic Volcanic Rocks

Tve **Edie School Rhyolite (Eocene)(Challis Volcanic Group)**—Gray to brownish pink, glassy rhyolite volcanics and welded tuff volcaniclastics. Large phenocrysts of biotite and hornblende and flattened pumic vessicles. Unit outcrops as distinct ledges along the eastern margin of the map area and is 11 meters in average thickness (Garmezy, 1981).

Mesozoic Sedimentary Rocks

Trd **Dinwoody Formation (Lower Triassic)**—Tan, beige, to yellowish brown calcareous and micaceous shale and siltsone with interbeds of brownish gray limestone and very fine sandstone. Sharp contact with the underlying Phosphoria Formation and upper contact unknown due to very poor, gentle slope exposure at southeast portion of map area only. Previous workers have postulated a thickness of over 300 meters (Lucchitta, 1966; Evans and Green, 2003).

Paleozoic Sedimentary Rocks

Pp **Phosphoria Formation (Permian)**—Interbedded gray to black carbonates and blue siltstone with thick, massive black chert beds. Lower beds dominated by thick, lenticular to ropey chert while upper beds dominated by massive chert. Within the chert, lenses of black to purple phosphorite are present. This formation is poorly exposed along a gentle slope in the southeast corner of the map area only. The thickness is estimated at 76 meters (Garmezy, 1981).

IPsc **Snaky Canyon Formation (Lower Pennsylvanian to Lower Permian)**

IPscj **Juniper Gulch Member (Upper Pennsylvanian to Lower Permian)**—Light gray to light brown, thin to thick bedded sandy limestone and dolomite. Weathers pinkish to olive gray. Fossiliferous and significant lensoidal to nodular chert locally. Less fossiliferous than the lower Bloom Member and bedding becomes increasingly thinner upsection. Forms small, linear ledges and cliffs along eastern ⅓ of map area. Thickness is approximately 600 meters (Skipp et al., 1979; Garmezy, 1981).

IPscg **Gallagher Peak Member (Mid- to Upper Pennsylvanian)**—Tan to beige to light brownish pink, thin bedded, fine grained calcareous quartz sandstone. Interbedded with minor, medium bedded sandy limestones. May be heavily crossbedded. Member outcrops throughout eastern ½ of the map area and may form cliffs or ledges (as at Gallagher Peak), but commonly is signified by rubble covered slopes. The thickness of this member is 60 meters (Skipp, 1979; Skipp, 1984; Garmezy, 1981).

IPscb **Bloom Member (Lower to Upper Pennsylvanian)**—Light gray to dark gray medium to coarse grained fossiliferous limestone and sandy to silty limestone interbeds. Limestone contains heavy intervals of black, nodular chert and is thin to medium bedded. Interbedded sandy limestones and light brown, thinly bedded calcareous sandstones dominated by very fine to fine grained quartz and may be crossbedded. This member outcrops as small, distinct ledges and intervening rubble slopes along the eastern ½ of the map area. The lower contact with the Bluebird Mountain Formation is gradational. Total thickness is 647 meters (Skipp, 1979; Skipp, 1984; Garmezy, 1981).

PMbm **Bluebird Mountain Formation (Upper Mississippian to Lower Pennsylvanian)**—Tan, gray, to light brownish pink fine to medium grained quartzose sandstone and "orthoquartzite" interbedded with thinly bedded gray, fossiliferous carbonates. Sandstones may be crossbedded and individual grains range from sub-rounded to sub-angular. Exposure is often signified by abrupt cliffs and ledges or by steep talus throughout a majority of the field area. Contacts above and below are gradational and the total thickness of the unit is 107 meters (Skipp et al., 1979; Skipp; 1984; Garmezy, 1981).

Mbs **Big Snowy Formation (Upper Mississippian)**— Dark gray, blue, to black fissile shale, phosphatic limestone, calcareous shale, and rare sandstone. Unit is dominated by dark calcareous and noncalcareous shales, with limestone and thin sandstones confined to middle of formation. Shale may be gypsiferous and fissile with calcareous concretions near base. Limestones may be heavily fossiliferous and contain abundant dark fragments of phosphatic brachiopods. This unit outcrops throughout the study area and is often signified by poorly exposed gentle grassy slopes, landslides, and saddles. The contact with the overlying Bluebird Mountain Formation is gradational and the lower contact with the Surrett Canyon is sharp, yet conformable (Skipp, 1984; Garmezy, 1981).

Msuc **Surrett Canyon Formation (Upper Mississippian)**—Dark gray to dark blue and black, fine to medium grained fossiliferous and medium to thick bedded limestone. May weather to pale gray to pale yellowish gray and contain thin intervals of silty carbonate. This unit outcrops along the range crests of the Copper Mountain quadrangle and often forms distinct ledges. This unit may pinch out laterally and total thickness is between 0 and 69 meters. The contact with the underlying South Creek formation is gradational and conformable (Garmezy, 1981; Skipp, 1984).

Msc **South Creek Formation (Upper Mississippian)**—Dark gray to black, medium to thin bedded unfossiliferous limestone. May contain significant interlayered chert and intervals of silty and fissile carbonate. The unit outcrops along the range crests of the Copper Mountain quadrangle and forms rubbly talus slopes of blocky carbonates with thin, minor ledges. This unit may pinch out laterally and total thickness is between 0 and 122 meters. The contact with the underlying Scott Peak Formation is gradational (Garmezy, 1981; Skipp, 1984).

Msp **Scott Peak Formation (Mid- to Upper Mississippian)**—Light to medium bluish gray limestone subdivided into three members. The upper member is a medium to thick bedded, cyclic, dark gray crystalline limestone. This member may be bioclastic and also contains thin bedded intervals of fine grained, chert bearing limestone. The middle member is characterized by very thick, massive beds of dark, fossiliferous limestone. This member contains very little chert and often outcrops as distinct, massive gray cliffs. The cyclic lower member is composed of alternating thin beds of coarse bioclastic limestone and dark, fine-grained chert bearing limestone. This member may also contain thin intervals of sandy and silty, yellowish carbonate. The formation outcrops along the entire western ½ of the study area. Outcrop patterns widely vary and range from covered slopes and talus to massive, sharp cliffs that dominate the western range. The contact with the underlying Middle Canyon Formation is gradational. The total thickness of the Scott Peak Formation is 450 to 610 meters in this area (Skipp, 1984; Garmezy, 1981; Stamm, 1981).

Mm **Middle Canyon and McGowan Creek formations (undivided) (Lower Mississippian)**—Dark gray to light gray and yellow to brown fine-grained limestone and fine-grained sandstone to siltstone. Upper (Middle Canyon) marked by thin to medium bedded limestone and interbedded calcareous siltstone and very fine grained quartz sandstone without chert. Uppermost beds may be marked by coarsely fossiliferous, medium bedded and dark limestones. Lower (McGowan Creek) unit is a gray to grayish black crystalline limestone. The unit may contain dark chert interbeds and thin beds of siliceous mudstone or siltstone with minor plant debris. Both units are poorly exposed and may form rubbly, steep slopes. These units outcrop along the western flanks of the range. The lower McGowan Creek weathers to a light to dark brown soil and is most notably exposed as a rock outcrop in mine cuts. The underlying contact with the Devonian Jefferson Formation is unconformable. The combined thickness is around 450 meters (Skipp, 1984; Garmezy, 1981).

Dj **Jefferson Formation (Upper Devonian)**—Yellowish tan to dark grayish brown carbonate and fine grained sandstone to siltstone interbeds at base. May be locally dolomitic and conglomeratic with solution cavities. Unit is exposed in mining or road cuts in Long Canyon along the western flanks of the range and often forms grassy, gentle slopes. The total thickness of the unit is postulated to be between 15 and 60 meters (Garmezy, 1981; Skipp, 1984).

MD **Lower Mississippian and Upper Devonian**—Undifferentiated

Pz-pE **Lower Paleozoic**—Undifferentiated

Proterozoic Meta-Sediments

pEq **Belt Supergroup - Swauger Member (Mesoproterozoic)**—Red and purplish to brownish red impure medium to coarse grained, thick bedded sandstone to quartzite. May be locally conglomeratic and heavily crossbedded with large foresets. Compositionally composed of around 70% quartz, 25% feldspar, and 5% opaques in thin laminations. Unit outcrops as small ledges and total thickness is believed to be over 300 meters (Garmezy, 1981; Evans and Green, 2003).

SYMBOLS

BEDDING SYMBOLS

- strike and dip of bedding
- bedding overturned
- horizontal bedding
- vertical bedding

UNIT CONTACT SYMBOLS

- rock unit contact
- inferred rock unit contact

STRUCTURAL SYMBOLS

- normal fault (indicator on downthrown side; dashed where inferred)
- low-angle detachment normal fault (indicator on downthrown side; dashed where inferred)
- thrust fault (teeth on upper plate; dashed where inferred)
- anticline (dashed where inferred axis)
- syncline (dashed where inferred axis)
- overturned anticline (dashed where inferred axis)
- overturned syncline (dashed where inferred axis)

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Base map from USGS Digital Raster Graphic files of the Copper Mountain, Scott Butte, Shamrock Gulch, and Snaky Canyon quadrangles. All quadrangles published in 1969.

For all quadrangles, topography by photogrammetric methods from aerial photographs taken in 1967 and field checked in 1969.

Polyconic projection. 1927 North American Datum.

1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue.

UTM Grid and 1969 Magnetic North Declination at Center of Map [Copper Mountain and Scott Butte quadrangles]

UTM Grid and 1969 Magnetic North Declination at Center of Map [Shamrock Gulch and Snaky Canyon quadrangles]

Contour interval 40 feet

Quadrangle Location

Adjoining Quadrangles

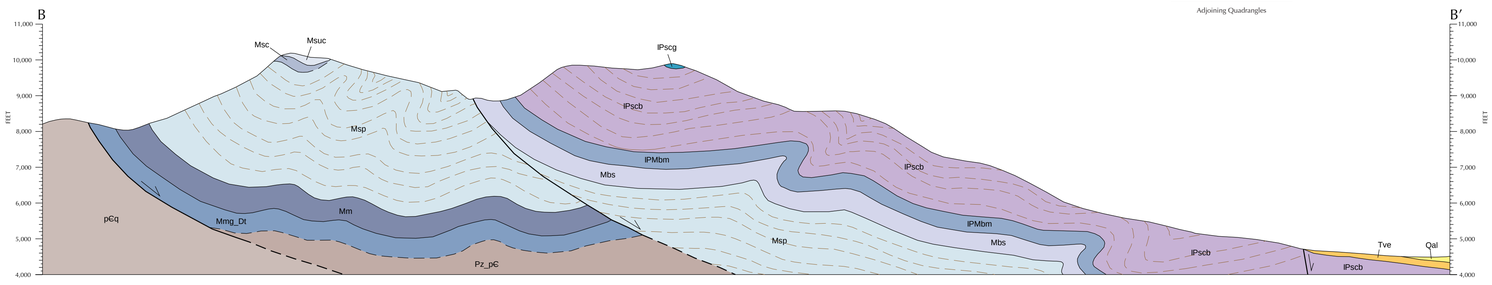
Field work conducted 2006.

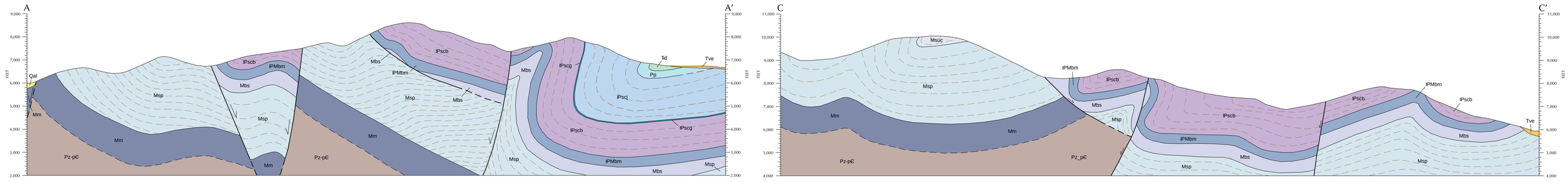
The authors would like to acknowledge the EDMAP program for providing funding for this reseach.
Digital cartography by Theresa A. Taylor and Jane S. Freed at the Idaho Geological Survey's Digital Mapping Lab.

Note on printing: The map is reproduced at a high resolution of 600 dots per inch. The inks are resistant to run and fading but will deteriorate with long-term exposure to light.

Map version 9-11-2008.

PDF (Acrobat Reader) map may be viewed online at www.idahogeology.org.





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