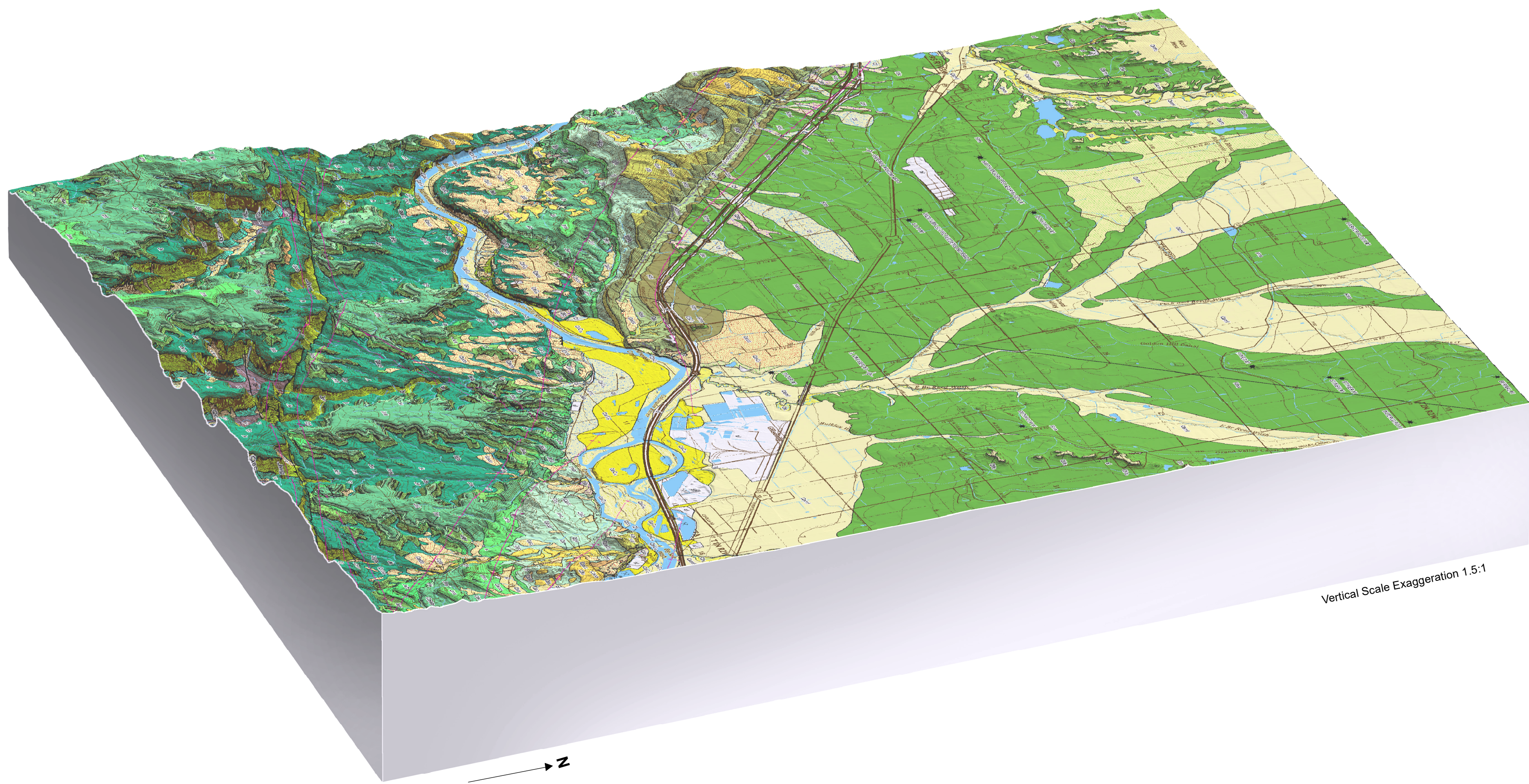


3-D OBLIQUE VIEW



The Mack 7.5-minute quadrangle lies in west central Colorado, 9 miles from the Utah border. The Colorado River and Interstate 70 cross the quadrangle at the geomorphic transition from the Grand Valley alluvial to structural terrain of the Uncompahgre Plateau. North of Interstate 70, the quadrangle lies on flat lands underlain by the thick Mancosha Sand, much of which is irrigated with Colorado River water through the Grand Valley irrigation canal system. Pleistocene-aged alluvial fans and stream gravel that flowed from the Rocky Cliffs have formed small fans and badland gullies in the valley through base-level-controlled lowering of the geomorphic surface. South of Interstate 70, the quadrangle contains rolling hills and a small mountain. The Uncompahgre Plateau in the public lands of the U.S. Bureau of Land Management's Mclintoc National Conservation Area (MNCNA), immediately southeast of the quadrangle is the Colorado National Monument, which contains similar topography, geology, and the same general NW-SE trends of the regional structural geologic terrain (Scott and others, 2001).

The Uncompaghe Plateau is 95-mi long, NW-SE striking, antiformal uplift located on the Colorado Plateau (Lohman, 1965; Heyman, 1983; Heyman and others, 1986). The SW half of Mack quadrangle extends into the NE margin of the Uncompaghe Plateau. The original uplift was a much broader mountainous area that was eroded and dissected by the Colorado River and its tributaries. The plateau and the mountains eroded and were beveled to crystalline basement rocks near the regional topographic base level, and subsequently buried by 6,500 ft of terrestrial and marine Mesozoic sediments. Compressive deformation during the later Laramide Orogeny (40–40 Ma) reactivated the ancestral mountain range into the current Uncompaghe Plateau. The NE margin of the Uncompaghe Plateau is a classic Laramide orogenic belt. The Colorado Plateau, Uncompaghe Plateau, and the surrounding area are characterized by faults that originate in the more rigid Precambrian crystalline basement rocks. The overall monoclinal fold shape is a result of "forced folding" or "passive" bending of sedimentary strata above steeply-dipping faults. Exposures at the bottom of the deep canyons in the Mack quadrangle reveal the monoclines to be faulted and folded. The faults are generally normal faults, but some are thrust faults. The faults are brittle-ductile sedimentary rocks above. The fault offset attenuates and typically "dies" in deformed sedimentary rock within the steep monoclinal fold. The sedimentary rock forms a S-shaped fold between the anticlinal (upthrown arch) and synclinal (downthrown sag) hinge lines of the fault-cored monocline, and contains a variety of fault-related structures, faults, microfractures and microfaults. The bending is not as significant structural thinning.

Lohman (1965), Heyman (1983), and Heyman and others, (1986) recognized and named multiple Laramide-age structures in the Mack quadrangle area. Major structures of the Mack quadrangle include: 1) the NW-SE striking Redlands monocline; 2) the NW-SE striking Flume Creek monocline; 3) a WNW-ESE striking, complex zone of deformation from high-angle faults with a left-lateral, oblique-slip component referred to as the Bull Canyon-Flume Creek fault zone; 4) a structural spur of the Flume Creek fault zone - the W to E striking Devils Creek monocline; and 5) a more recently identified conjugate, NE-SW striking, right-lateral, oblique-slip, play fault found in the Pollock Canyon area (Livaccari and others, 2008).

The Redlands monoclinal strike NSW where it enters the Mack quadrangle (Livaccaro and Dodge, 2009). The anticalinal limb of the monocline (dipping 30°–66° northeastward) is observed in folded bedding exposed along the Colorado River bluff near the confluence of Devils Canyon Creek, Northwestward, the anticline is more than 100 km wide. Isoclinal in the Colorado River, the Redlands Flume Creek monocline limb also dips moderately to steeply to the NE (30°–71° NE) and is also breached by the SW-dipping Colorado River in the central part of the Mack quadrangle. The Colorado River alluvium covers any structural relationship between the Redlands and Flume Creek monoclines. However, the monocline hogback strike exposed on the north bank of the river rotates 30° east to southeast and the striking hinge fault structurally merge below the river alluvium. The more complex WNW-ESE monocline bulging Canyon-Flume Creek fault zone is the westward continuation of the Laramide-age NWS-E striking Redlands reverse fault faulted in the Colorado National Monument (Scott and others, 2001), but bends in the north to more easterly orientations. The Redlands reverse fault zone is a complex of several orientations on slickensides along the Redlands reverse fault are dip-slip (Scott and others, 2001). For the Bull Canyon-Flume Creek fault, slickenside striations can be oblique, suggesting a left-lateral strike-slip component of the fault. Throughout its length in the Mack quad, while the sense of strike-slip is generally left-lateral, the sense of dip-slip is variable, but generally is normal, and the sense of dip-slip is either dipping steeply to the north or dipping steeply to the south. These wobbling dip changes occur over distances of several hundred feet. The north side of this fault is always the downthrown side, therefore, when the Bull Canyon-Flume Creek fault dips south, the sense of dip-slip is reverse, when it dips north the sense of dip-slip is normal. The corresponding monocline of the Bull Canyon-Flume Creek fault, located in the central part of the Mack quad, is a left-lateral strike-slip fault (Fig. 1). The Redlands Flume Creek monocline (dipping 30°–66° NE) is a moderate to steeply dipping (3°–50°) WNW-ESE monocline. The Redlands Flume Creek fault resulted in the development of networks of outcrop-scale structures that strike at highly oblique angles to the overall strike of the monocline (interpreted to be NNE-SSW striking, right-lateral, R-shear) and are mapped at 1:24,000 scale.

The authors are indebted to the private landowners who provided access to areas on this map. We specifically thank the following for access to larger or important map areas: MCNCA manager Collin Ewing for mapping access to BLM property, U.S. Bureau of Reclamation, Bob and Cindy Sherrill for facilitating access into and through private lands of the Pollack Canyon Estates, Dale Bittle for access to his property near I-70, and Melvin Barbour for access onto his farm on Mack Mesa. Some structural data points were taken from an unpublished EDMAP map by Livaccari and others (2008). We also acknowledge the work of Felicia Adams, who independently mapped areas of this quadrangle that are shown in several other maps, including the Williams' Geologic Trail. The map was also benefited from reviews by Karen Berry, Matthew Morgan, and Dr. William Wood. Larry Scott (CGS) drafted the cross section. Karen Morgan completed the preliminary GIS polygons and Pangaea Geospatial produced the map labels and GIS files for this publication.

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2015