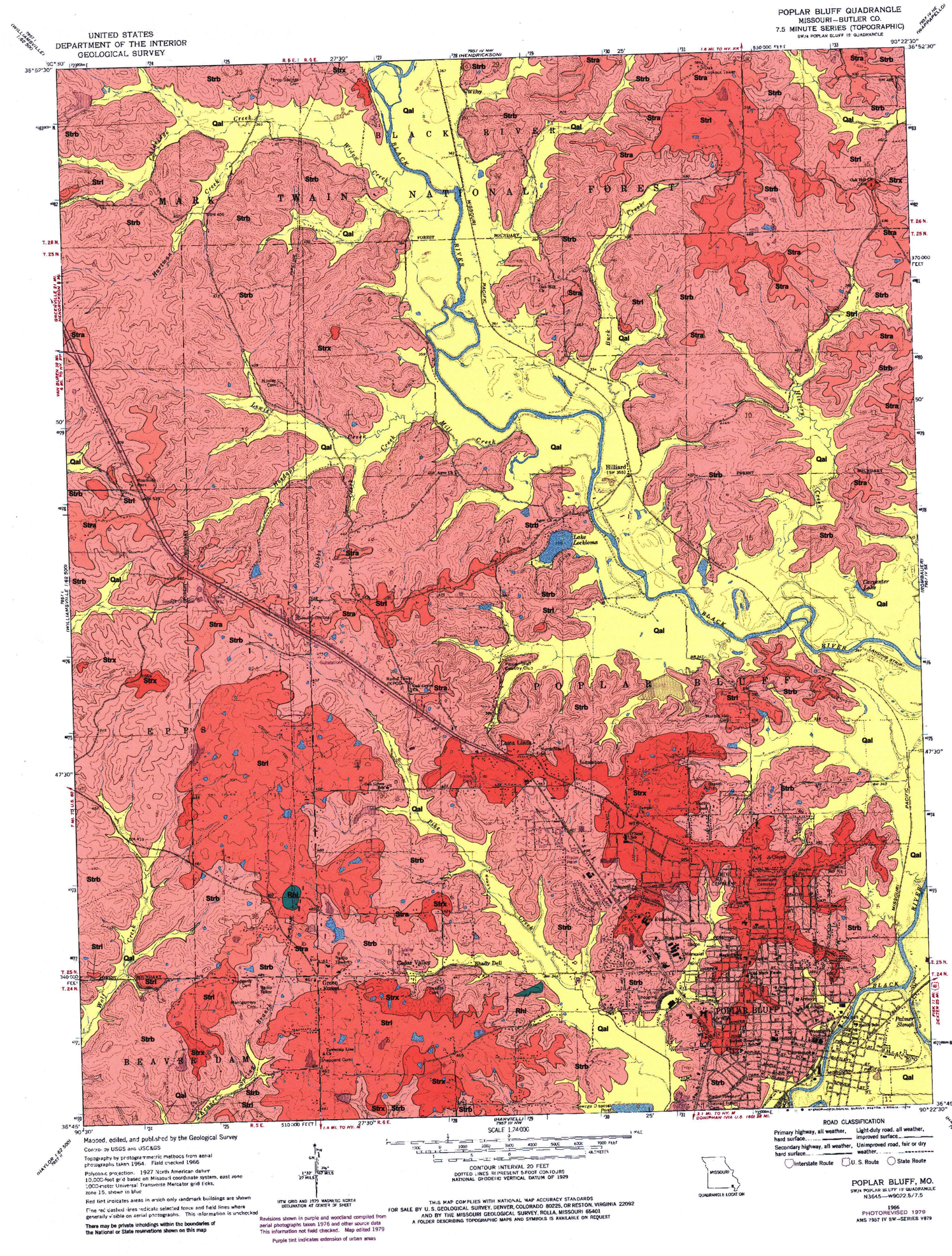

DRAFT

SURFICIAL MATERIAL GEOLOGIC MAP OF THE POPLAR BLUFF 7.5' QUADRANGLE; BUTLER COUNTY, MISSOURI

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PHYSIOGRAPHY

The Poplar Bluff Quadrangle lies at the southeastern edge of the Salem Plateau subdivision of the Ozarks Physiographic Province. The Ozark Escarpment forms the boundary between the Ozarks and the Southeastern Lowlands Province (Mississippi Embayment) in the southeast corner of the map area. Exposed bedrock units are widely separated in age. They consist mostly of sandstone, chert, and dolostone of lower Ordovician (Ibexian) age, but these are locally overlain by undifferentiated Quaternary or Tertiary deposits of gravel, sand and clay (QTgu), (Baker, 2000). The oldest rocks, Gasconade Dolomite, have been eroded to form bluffs and ledges along the Black River. The Roubidoux Formation overlies the Gasconade and is the surface bedrock beneath most of the upland areas of the quadrangle. Few outcrops of Roubidoux are exposed, and consist mostly of sandstone and chert, though a few dolostone bluffs and ledges can be found adjacent to Carpenter Lake and along the Black River, in the southeast quarter of the quadrangle. Most of the upland surface area is buried by a thick mantle of residuum and colluvium, derived primarily from weathering of the Roubidoux, with local patches of other unconsolidated materials, including Quaternary loess, gravel, and the bedrock unit QTgu.

Faults and folds are common, but are poorly exposed as bedrock outcrops. Their presence can be recognized by areas of silicification, iron mineralization, and brecciation of Roubidoux cherts. These diagnostic rock types are commonly found as loose blocks and boulders in the surficial material along faults. The structures have influenced the shape of the topography resulting in numerous lineaments that are visible on topographic maps and air photographs. The most striking lineaments consist of long straight ridges and stream segments. Most of these trend northeast to southwest with a second common trend from northwest to southeast. An excellent example of the influence that the faulting has on the topography can be seen where the Widow Creek Fault lies along the steeper north slope of the ridge in Sec 6, T25N, R6E and continues to the southwest along the straight stream segment in Sec 1, T25N, R5E (Baker, 2000). More subtle lineaments consist of angular offsets of ridge, stream, or valley direction, and matched drainages on the opposite sides of ridges and valleys.

The highest elevation on the quadrangle is 584 feet above sea level and is located near the northern edge of the quadrangle at the Oak Lookout Tower in the NW1/4, SW1/4, Sec 27, T26N, R6E. The lowest elevation (320 feet above sea level) is where the Black River exits the map to the south in the city of Poplar Bluff (Sec 10, T24N, R6E). Total relief is 264 feet. A maximum local relief of about 160 feet can be found at several locations throughout the quadrangle.

SURFICIAL MATERIALS

Surficial materials on the Poplar Bluff Quadrangle have been differentiated into three major types. The St. Robert Unit consists mostly of residual materials derived from the Roubidoux Formation and Gasconade Dolomite. The Rock Hill Unit consists of the weathered gravel, sand and clay derived from Quaternary or Tertiary strata (QTgu). The Alluvia Unit includes all of the sediment types deposited by Holocene fluvial processes.

ST. ROBERT UNIT - This unit is primarily comprised of residual material derived from the weathering of dolostone, sandstone, and chert of the Gasconade Dolomite and Roubidoux Formation, but also includes deposits of rounded gravels and loess that have been spread across the upland plains by streams and wind. It is present on gently rolling summits, uplands, slopes, and steep narrow valleys down to the edge of streams and major tributaries. The total thickness of the St. Robert Unit is quite variable, but is more than 250 feet in a water well near the northeast corner of the map in the NE1/4, NE1/4, Sec 34, T26N, R6E. Four sub units or facies of the St. Robert are present on the Poplar Bluff Quadrangle, including: St. Robert (a) - the residual facies, St. Robert (b) - the colluvial facies, St. Robert (l) - a facies with over 3 feet of loess overlying residuum, and St. Robert (x) - a facies that includes rounded gravel on the surface or more than 1 foot of rounded gravel overlying residuum. The boundaries between these units are seldom exposed and are typically gradational. Therefore, the contacts shown on the map are very generalized.

Stra St. Robert (a) is typically present on level to gently rolling landforms, including crests of lower ridges, knobs, benches, and upland plains. It consists of reddish-brown, sandy, silty, stony clay interbedded with relict layers of chert and sandstone. Varying amounts of sand and silt exist in the blocky, low density clay. Stony fragments of chert and sandstone typically comprise 20 to 70 percent of the total volume. Boulders and layers of chert, and sandstone (varying from friable to orthoquartzite) are scattered over most of the land surface and locally exceed 3 feet in diameter. On the broad uplands, the reddish brown, stony residuum may be overlain by an illuviated residuum, gravel, and loess in ascending order. The illuviated residuum is less than 2 feet thick, is typically stone-free, and commonly forms a fragipan/hardpan horizon. The gravel is typically less than 1 foot thick and consists of subangular to rounded chert pebbles mixed with sandy silt. Where illuviated residuum and gravel are present they may be overlain by loess, up to 3 feet thick. Outcrops are very rare and occur only where excavations have cut through the surficial material. Total thickness of the St. Robert (a) generally exceeds 10 feet and may be over 200 feet.

Strb St. Robert (b) is located on slopes and valleys subjacent to St. Robert (a), and on narrow ridges. It typically consists of residual chert and sandstone detritus varying from small chips to blocks that are a few feet in diameter. The matrix is a mixture of sand, silt, and clay and is typically reddish-brown. Loess and rounded gravels are locally carried down slope along with the colluvium derived from the residuum, yielding a hybrid composition and a yellow-brown color. Rounded gravels also occur along channels in the upland headwater areas of many of the tributaries, close to the divides. The rounding of these pebbles and cobbles is inherited from previous depositional events. These gravels may be included in either the St. Robert (b) or the Alluvia unit, depending on how extensive they are and where they are located. Roubidoux detritus, including large blocks, occurs locally at the foot of slopes, even below Gasconade outcrops. Bedrock exposures of Roubidoux are rare except where excavations have removed the residuum or colluvium. Both Roubidoux and Gasconade outcrops occur along the edge of the flood plain of the Black River and its tributaries where ledges and bluffs have been bypassed by the downslope movement of colluvium, or have been incompletely covered by the debris. Thickness of the colluvium varies from 5 feet to more than 60 feet. Where the colluvium has moved across and buried residuum on lower benches, the combined thickness of the colluvium and underlying residuum may be well over 100 feet.

Strl St. Robert (l) is mostly found capping the broad upland areas of low relief in the southwest and northeast parts of the quadrangle, although there are a few smaller areas. This unit consist of those areas where there is more than three feet of loess overlying materials that would otherwise be included in St. Robert (a or b). The maximum observed thickness of loess was 7 feet along the newly cut highway bypass south of Green Forest in Sec 6, T24N, R6E. Total thickness of the unit would depend upon the thickness of the underlying residuum and could exceed 200 feet.

Strx St. Robert (x) occurs mostly in and around the city of Poplar Bluff and in the uplands west of the city. It is locally transitional to St. Robert (a) and St. Robert (l) facies. The distinguishing characteristic of the "x" facies is the presence of significant amounts of rounded upland gravel capping the materials of St. Robert (a or b). The gravel typically varies from 1 to 5 feet thick. Thicker sections may be present, but not exposed. Loess is commonly also present, but not always. This gravel facies is also mapped where surficial gravels occur locally on benches at lower elevations, although the relationship between the gravels at different elevations is undetermined.

Rhi ROCK HILL UNIT - This unit has only been identified in two isolated localities where structures containing strata of QTgu have been exposed by excavation. It consists primarily of the residual material that is derived from weathering of the Quaternary or Tertiary undifferentiated gravel bedrock unit (QTgu), but also includes any overlying materials, typically younger gravel and loess of undetermined Quaternary age. The Rock Hill is only mapped where there are known occurences of QTgu.

QTgu has only been positively identified in structurally low areas of synclines and along the downthrown side of faults. It is mostly unconsolidated, like the surficial material units, but has been folded and faulted along with the older bedrock units and is therefore mapped as a bedrock unit (Baker, 2000). This poses an interesting problem in mapping and nomenclature because the QTgu "bedrock" unit overlies weathered "surficial material" derived from the Ordovician bedrock formations that would typically be included in the St. Robert Unit.

Like the QTgu bedrock unit, the basal part of the Rock Hill is only exposed in structural lows where the material has been sheltered from erosion. The base is conformable with the dipping beds of the QTgu and the top is truncated and overlain by a younger gravel and loess with angular unconformity. The basal part of the Rock Hill Unit is red to gray mottled sandy and gravelly clay, with the gravel increasing toward the top. The gravel is poorly sorted, floating in a sandy clay matrix, and appears to be colluvial material derived from erosion of QTgu and Roubidoux strata during structural deformation.

The gravel overlying the angular unconformity is more laterally extensive than the colluvial material and also lies directly on truncated beds of QTgu and the Roubidoux Formation. It is similar in composition to the gravel of the lower part of the Rock Hill and QTgu, but lacks the well developed patina on the surface of the stones. Only about 15% of the gravel has a patina compared with about 85% in QTgu. This may indicate that only 15% is reworked from the QTgu deposits with the balance being eroded from older formations. This is the same rounded gravel that is mapped with the St. Robert unit when the underlying bedrock unit is Roubidoux or Gasconade.

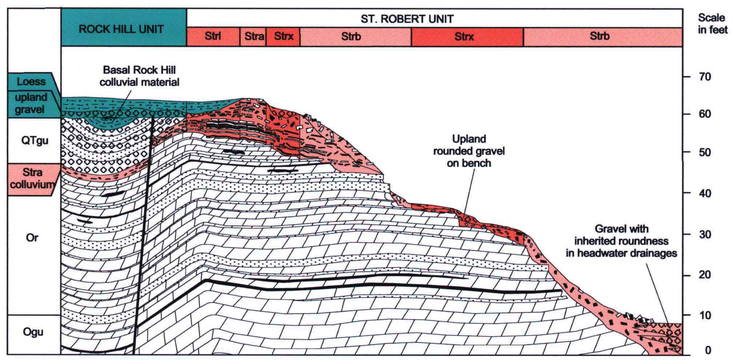
Most of the gravel from all of the gravel beds observed was derived from an original local source of Ordovician chert and sandstone with the remaining 5-10 percent consisting of fossiliferrous cherts similar to those found in Mississippian strata of the Ozarks.

The Rock Hill Unit varies from a feather edge to over 20 feet thick. The boundaries have little or no control and have simply been drawn to enclose a small area around the QTgu exposures. Many more occurrences are likely, but are hidden from view by the mantle of loess and lack of sufficiently deep excavations to expose the underlying material.

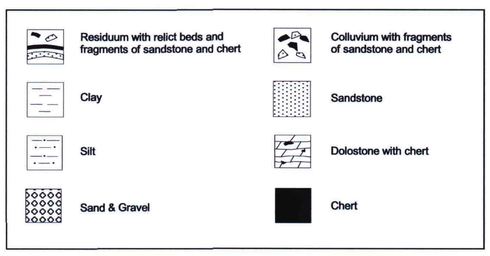
Qal ALLUVIA UNIT - This unit includes floodplain and channel sediments (Qal) of the Black River and all of its major tributaries. These sediments commonly interfinger with colluvial material of the St. Robert Unit along the valley margins and in the headwater areas of tributaries.

Channel and overbank sediments of the Black River and the larger tributaries consist predominantly of sand, silt and clay. Silt is the most common material. Terraces are not obvious on air photographs or in alluvial areas that were visited in the field. It appears that the Black River and the tributaries are filling their valleys with fine sediments. These aggrading fluvial deposits abut the slopes or interfinger with colluvium on either side of the flood plain. Meander scars, oxbow lakes, abandoned channels, and point bars are common across the valley floors. These geomorphic features account for the topographic relief observed on the flood plains. Sediment in the lower reaches of the tributaries is similar to the silt dominated material of the Black River. Most of these tributaries have broad flat valley floors with meandering channels. There is a fairly sharp transition between the aggrading parts of the tributaries and the upstream reaches that are dominated by erosion. The upstream areas have narrow "V-shaped" valleys with very little fine sediment in the channels. The sediment includes pebbles, cobbles and boulders of chert and sandstone recently weathered from the colluvium as well as rounded and polished pebbles and cobbles derived from Quaternary upland gravels, the Rock Hill Unit, or QTgu. Sand occurs locally in these upstream areas, but silt and clay have largely been winnowed away. The thickness of the Alluvia Unit varies from less than 1 foot at the edge of valleys and in the upstream areas to more than 80 feet in a well along the Black River in the city of Poplar Bluff.

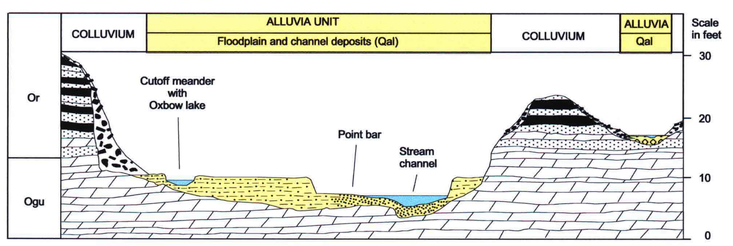
UPLAND SURFICIAL UNITS PROFILE



TYPICAL MATERIALS LEGEND



ALLUVIA SURFICIAL UNIT PROFILE



REFERENCES

Baker, H. W., 2000, BedrockGeologic Map of the Poplar Bluff 7.5-minute Quadrangle, Butler County, Missouri, OFM-00-365-GS.

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