Geologic Maps of Missouri National Recreational River

Nebraska and South Dakota

National Park Service
U.S. Department of the Interior

Geologic and Soil Resources Inventory
Natural Resource Stewardship and Science

Geologic Map of Missouri National Recreational River

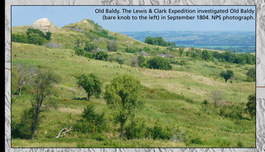
Chalkstone bluffs. Scenic river bluffs along the Missouri River consist of the Cretaceous Smoky Hill Chalk Member of the Niobrara Formation. NPS photograph.



North Alabama steamboat wreckage. The steamboat sank on 27 October 1870 and the remains reappeared in the spring of 2004 during a period of low river level. NPS photograph.



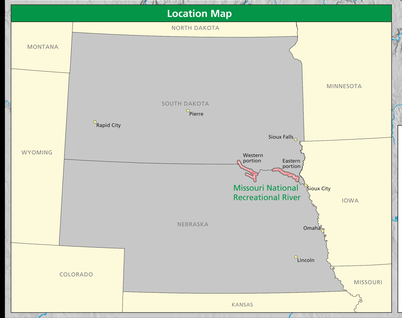
Old Baldy. The Lewis & Clark Expedition investigated Old Baldy (bare knob to the left) in September 1804. NPS photograph.



Two prairie dogs (*Cynomys*) perch alertly on the plains, descendants of the "barking squirrel" first documented by Lewis and Clark in 1804 and once misclassified as marmots under the genus *Arctomys*. NPS photograph.



Location Map



This map displays geologic map data compiled by the National Park Service Geologic Resources Inventory (GRI). It is not a substitute for site-specific investigations. All GRI products are available at https://go.nps.gov/grigubs.

GRI Source Maps:

Joeckel, R. M., N. J. Scofield, D. P. Divine, and L. M. Howard. 2019. Surficial geologic map of Missouri National Recreational River corridor and surrounding areas in Nebraska and South Dakota, Fort Randall Dam and environs to Springfield, Nebraska and South Dakota (scale 1:24,000). Unpublished digital data. University of Nebraska-Lincoln, Lincoln, Nebraska.

Lundstrom, S. C., T. Cowman, P. Hanson, J. Holbrook, S. Mahan, A. Moreno-Ward, and J. Paces. 2022. Geologic map geodatabase of the valley corridor of the 59-mile reach of the Missouri National Recreational River, South Dakota, Nebraska, and Iowa (Lewis Point Dam to North Sioux City) (scale 1:100,000). Unpublished data release. US Geological Survey, Reston, Virginia.

Source Scales: 1:24,000 and 1:100,000. According to US National Map Accuracy Standards, features are within 12 m (40 ft) and 51 m (167 ft), respectively of their true location.

Poster Layout: Trista L. Thornberry-Ehrlich (Colorado State University)

Poster Date: May 2025

LEGEND

- NPS boundary
- Highways and roads
- Water
- Places of interest
- State park boundary
- Wildlife refuge boundary
- Reservation boundary
- Geological sites

Geologic Line Features

- Past river extent, concealed
- Point bar, known or certain
- Fluvial scarp, known or certain

Geologic Sample Points

- Radiocarbon age-date locality
- U-series age-date locality
- Optically stimulated luminescence age-date locality

Landslide Areas

- Landslide area, contacts known or certain
- Landslide area, contacts inferred

Geologic Contacts

solid black where known or certain, long dashed where approximate, dashed where inferred, dotted where concealed, blue where a shoreline

- contact

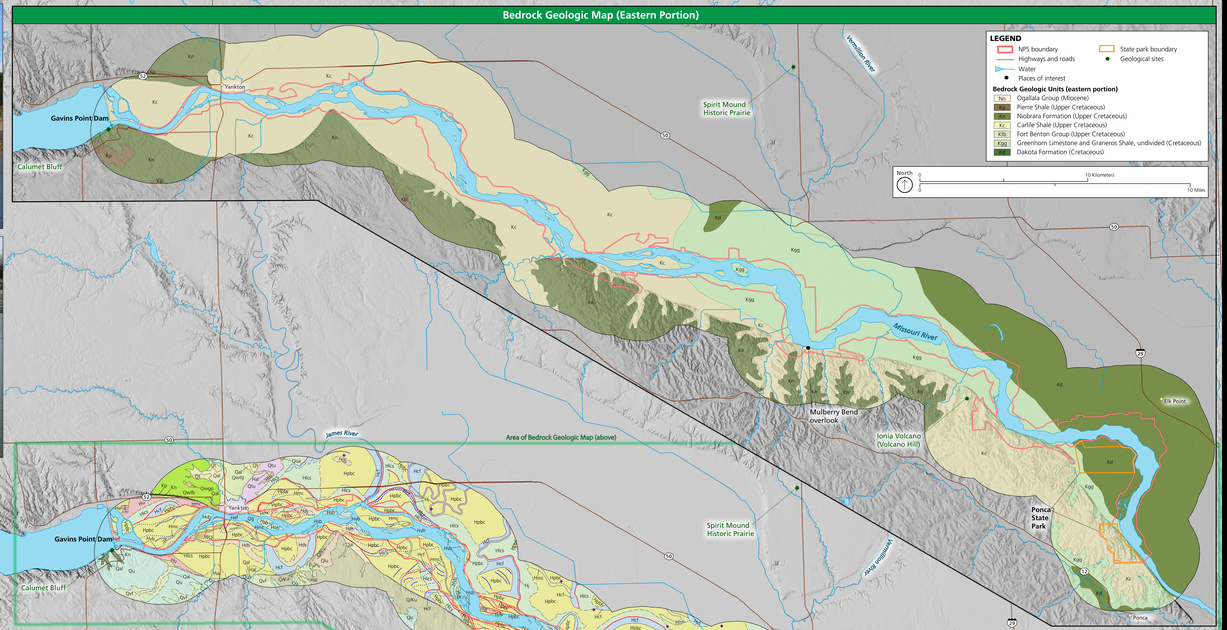
Geologic Units (western portion)

- Qg | Pit (Holocene)
- Qfi | Fill (Holocene)
- Qnbr | Niobrara River tributary delta, subaerial part (Holocene)
- Qf | Alluvial fan sediments (Holocene)
- Qc | Colluvium (late Pleistocene to Holocene)
- Qcnfc | Flood-channel deposits of Niobrara River (Holocene)
- Qal | Alluvium of small streams (Holocene)
- Qat1 | Alluvial terrace deposits of small streams (late Pleistocene to Holocene)
- Qtvc1 | Verdigre Creek alluvium, ca. 1951–present (Holocene)
- Qtvc2 | Verdigre Creek alluvium, late 19th and 20th centuries? (Holocene)
- Qtvc3 | Verdigre Creek alluvium, pre-late 19th century? (Holocene)
- Qpc1 | Ponca Creek alluvium, accreted ca. 1961 to present (Holocene)
- Qnpc2 | Ponca Creek alluvium, accreted ca. 1939–1961 (Holocene)
- Qnpc6 | Ponca Creek alluvium, accreted ca. 1858–1939 (Holocene)
- Qapc4 | Alluvium of Ponca Creek accreted prior to ca. 1858 (Holocene)
- Qapc5 | Alluvium of Ponca Creek, oldest (late Pleistocene to Holocene)
- Qsrmr | Sand ridges atop alluvium of Niobrara River (Holocene)
- Qan1 | Niobrara River alluvium, accrete ca. 1954–present (Holocene)
- Qan2 | Niobrara River alluvium, accreted ca. 1938–1951 (Holocene)
- Qan3 | Niobrara river alluvium, accreted ca. 1858–1938 (Holocene)
- Qan4 | Niobrara River alluvium, accreted prior to 1858 (Holocene)
- Qan5 | Niobrara River alluvium accreted prior to 1858, but older than Qan4 (Holocene)
- Qam1 | Missouri River alluvium, accreted post-ca. 1954–present (Holocene)
- Qam2 | Missouri River alluvium, accreted ca. 1939–1954 (Holocene)
- Qam3 | Missouri river alluvium, mid-19th century–1939 (Holocene)
- Qam4 | Missouri river alluvium, pre-mid-19th century (Holocene)
- Qalc1 | Lost Creek alluvium, ca. 1970–present (Holocene)
- Qalc2 | Lost Creek alluvium, pre-ca. 1970 (Holocene)
- Qalc3 | Lost Creek alluvium, intermediate low terrace (Holocene)
- Qalc4 | Lost Creek alluvium, higher low terrace (Holocene)
- Qabc5 | Bazile Creek alluvium, ca. 1957 to present (Holocene)
- Qabc2 | Bazile Creek alluvium, pre-1957 (Holocene)
- Qabc3 | Bazile Creek alluvium, oldest (Holocene)
- Qpo | Peoria Loess (thin) atop shallow Ogallala Group (late Pleistocene)
- Qpl | Peoria Loess (late Pleistocene)
- Qaeo | Eolian sands atop Niobrara River high terrace (late Pleistocene to Holocene)
- Qat2 | High alluvial terrace sediments of the Niobrara River (late Pleistocene to Holocene)
- Qtg3 | Till, stagnation moraine (late Pleistocene)
- Qtm2 | Till, ground moraine (late Pleistocene)
- Qmg1 | Younger coarse alluvium, interpreted as glacial outwash (late Pleistocene)
- Qmg2 | Older coarse alluvium, interpreted as glacial outwash (late Pleistocene)
- Qapc | High alluvial terrace sands of Ponca Creek (late Pleistocene)
- Qath | High alluvial terrace sand and gravel (late Pleistocene)
- Qtpi | Pre-Illinoian glacial till (Pleistocene)
- Nofr | Fort Randall Formation of the Ogallala Group (middle Miocene)
- Nov | Valentine Formation of the Ogallala Group (middle Miocene)
- Nb | Broadwater Formation (Pliocene to early Pleistocene?)
- Kp | Pierre Shale (Upper Cretaceous)
- Kmh | Smoky Hill Chalk Member of the Niobrara Formation (Upper Cretaceous)

Geologic Units (eastern portion)

- Hdp | Modern emergent sand bar (Holocene)
- Hdv | Modern vegetated sand bar (Holocene)
- Hep | Extractive pits (Holocene)
- Hef | Engineered fill (Holocene)
- Hbsa | Backswamp axial Yazoo alluvium and marsh deposits (Holocene)
- Hj | Alluvium of James River (Holocene)
- Hs | Alluvium of Big Sioux River (Holocene)
- Hal | Tributary alluvium, including alluvial fans (Holocene)
- Hds | Dune sand (Holocene)
- Qal | Tributary alluvium (Holocene and late Pleistocene)
- Qfp | Tufa, travertine and hosting clastic matrix (Holocene and late Pleistocene)
- Qoa | Outwash and alluvium (Holocene and late Pleistocene)
- Qls | Landslide deposits (Holocene and late Pleistocene)
- Hpbc | Point Bar and paleochannel sand (Holocene)
- Hlcs | Levee and crevasse splay silt and very fine sand (Holocene)
- Hcf | Abandoned channel fill (Holocene)
- Hmc | Minor channel and chute sediment (Holocene)
- Hu | Fluvial sediment of Missouri River, undivided (Holocene)
- Hbg | Backswamp mud (Holocene)
- Qaf | Valley fill (Holocene)
- QNu | Discontinuous thin undivided Quaternary sediments overlying Cretaceous rocks (Holocene and Pleistocene)
- Qes | Eolian sand (early Holocene and late Pleistocene)
- Qu | Undivided surficial deposits of uplands (Quaternary)
- Qtu | Terrace alluvium (Holocene)
- Qt | Alluvial and/or outwash terrace (Holocene and late Pleistocene)
- Qcl | Glacial gravel, including outwash (late Pleistocene)
- Qvngc | Glaciofluvial deposits along valley margin slope (late Pleistocene)
- Qvngp | Glaciofluvial deposits, pitted to flat morphology (late Pleistocene)
- Qvngr | Ridge-forming glaciofluvial deposits (late Pleistocene)
- Qvntg | Till of ground moraine (late Pleistocene)
- Qvmh | Till of hummocky moraine (late Pleistocene)
- Qvmb | Till of bedrock cored moraine or end moraine (late Pleistocene)
- Qlu | Peoria loess over older Quaternary units (late Pleistocene)
- Ql | Lower sandy loess (late Pleistocene)
- Qpf | Older glacial till and associated sediment (middle and early Pleistocene)
- Qo | Older glacial outwash and associated sediment (middle and early Pleistocene)
- Kpc | Pierre Shale (Upper Cretaceous)
- Knb | Niobrara Formation (Upper Cretaceous)
- Kcm | Niobrara Formation and Carlile Shale, undivided (Upper Cretaceous)
- Kc | Carlile Shale (Upper Cretaceous)
- Kgg | Greenhorn Limestone and Graneros Shale, undivided (Upper Cretaceous)
- Kgd | Greenhorn, Graneros, and Dakota formations, undivided (Cretaceous)
- Kd | Dakota Formation (Cretaceous)

Bedrock Geologic Map (Eastern Portion)



Spirit Mound. Fascinated by its cultural significance, the Lewis & Clark Expedition hiked to the summit of Spirit Mound in August 1804. NPS photograph.

