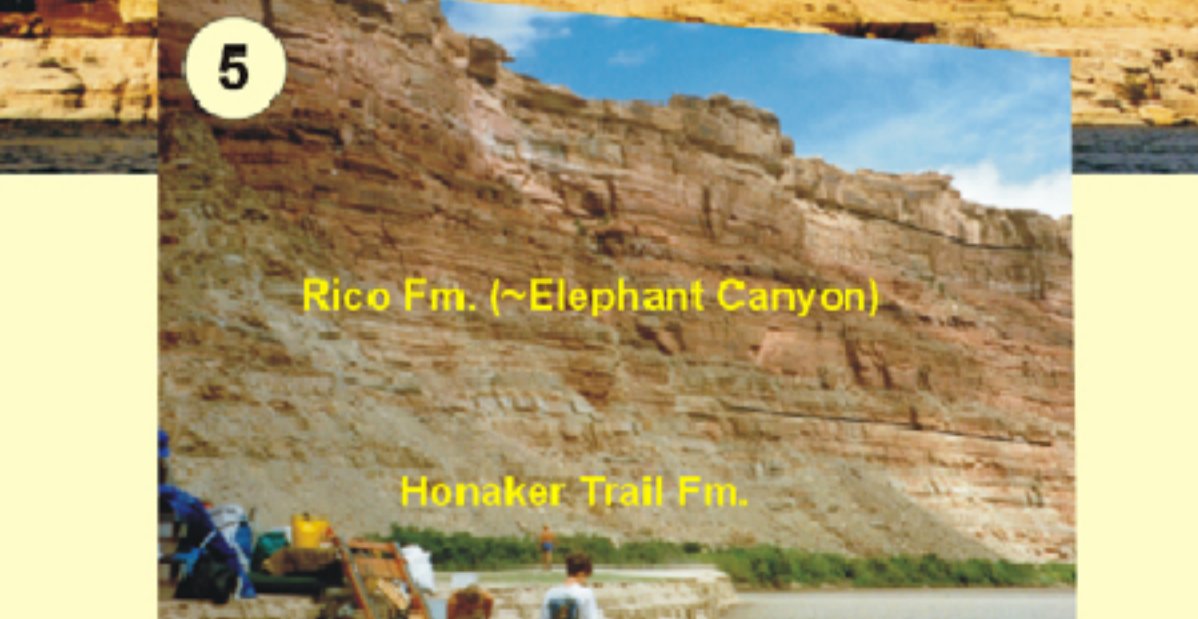


Photo Column

| Photo Column | | SYSTEM | FORMATION | SYMBOL | AVERAGE THICKNESS (FEET) | Lithology |
|-----------------|-------------------|------------------------------------|---------------------------------|--------|--------------------------|-----------|
| <p>1</p> | CRETACEOUS | Surficial Deposits | Qu | | | |
| | | Straight Cliffs Formation | Kwst | 1,500 | | |
| | | Tropic Shale | | 500 | | |
| | JURASSIC | San Rafael Group | Dakota Formation | Kd | 75 | |
| | | | Morrison Formation | Jm | 350 | |
| | | Glen Canyon Group | Romana Sandstone/Summerville Fm | | 215 | |
| | | | Entrada Sandstone | Js | 350 | |
| | | | Carmel Formation | | 200 | |
| | | | Page Sandstone | | 40 | |
| | | | Navajo Sandstone | Jg | 1,200 | |
| TRIASSIC | Glen Canyon Group | Kayenta Formation | | 310 | | |
| | | Wingate Sandstone | | 250 | | |
| | | Chinle Formation | Tc | 750 | | |
| PERMIAN | Cutler Group | Moenkopi Formation | Tm | 390 | | |
| | | White Rim Sandstone | | 75 | | |
| | | Organ Rock Formation | | 375 | | |
| | | Cedar Mesa Sandstone | Pc | 1,100 | | |
| | | Rico (Elephant Canyon)/Halgaito Fm | PIPr | 250 | | |
| PENNSYLVANIAN | Hermosa Group | Honaker Trail Formation | | 550 | | |
| | | Paradox Formation | IPh | 850 | | |
| | | Pinkerton Trail Formation | | 250 | | |



Not exposed

| Unit | Age m.y. | Thickness (feet) | Lithology | Color | Depositional Environment Other Attributes | Cross Reference (UGA Publication 28)* |
|---|--------------------------|--|---|---|---|--|
| Surficial Deposits | Present ~1 | 0-200+ | Highly variable: metamorphic and igneous intrusives, sandstone, limestone, dolomite, quartzite, siltstone and shale | Variable, similar to bedrock to gray in river gravel | Deposited by water, wind, mass wasting and freeze-thaw cycles. Chiefly unconsolidated, except caliche deposits. | |
| Straight Cliffs and Tropic Shale/Mancos Shale | 100 149 180 205 | 1,860-2,140 | Interbedded sandstone and shale with minor siltstone and coal | Dark-gray sh. tan to brown ss | Thick beach to coastal plain sandstone sequences intertongue with marine shale. Contains large coal reserves. Common fossil ammonites and minor pelocypods in shales. | Ar, CR, GS, T |
| Dakota Formation K-0 | | 20-170 | Sandy conglomerate, sandstone, shale, and minor coal | Tan to brown ss; gray sh | The unit is divided into a lower sandy conglomerate, middle mudstone with minor coal, and upper sandstone. Fossil oysters common at the top of the unit. Stream and nearshore marine deposits. | Ar, CR, GS |
| Morrison Formation | | 0-710 | Sandstone, conglomerate, siltstone, and minor mudstone | Tan ss, maroon to gray-green shale | Probable Salt Wash Member-equivalent beds occur in the south as ledgy outcrops. Minor dinosaur bone fragments and commercial uranium. Mudstones in the upper Brushy Basin Member are mined in other places for clay products. Flood-plain and overbank deposits | Ar, CR, GS |
| Romana Sandstone/ Summerville Fm. (north) | | 0-230 | Sandstone, fine- to coarse-grained, minor siltstone and red shale | Light-tan to gray-green, red at base | Thick-bedded cliff-former. Often indistinct contacts. Deposited by streams, some eolian deposits. | GS |
| Entrada Sandstone | | 38 | Bedded sandstone/siltstone | Red/white | Distinctive banded red and white ss/siltstone | Ar, CR |
| Carmel Formation | | 120-850 | Sandstone, very fine grained, siltstone and minor shale | Reddish-orange to white | Rounded slickrock outcrops in the south with numerous "injection features" and upper cliff-forming banded unit; chiefly eolian deposits. | Ar, CR, GS, T |
| Page Sandstone | | 110-250 | Sandstone, siltstone, platy limestone, shale and minor gypsum | Reddish-brown, gray to white | Interbedded red huee and white bands, slope-former, locally disturbed bedding, gypsiferous veinlets. Formed in and marginal to a shallow seaway. | Ar, CR, D, GS, T |
| Navajo Sandstone | | 0-300 | Sandstone, fine- to medium-grained, rounded quartz, calcareous & iron cement | Tan to light-reddish-brown | Very similar to the underlying Navajo, difficult to find lower contact. Local cherty lag at the basal unconformity. Ancient sand dune deposits. | Ar, D, GS, R, T |
| Kayenta Formation | | 1,170-1,230 | Sandstone, fine- to medium-grained rounded quartz, calcareous & iron cement | Tan to light-reddish-brown | Large-scale cross-beds, steeply dipping laminae, exposures are typically "slickrock." Forms many alcoves and Rainbow Bridge; contains thin "oasis" limestone beds. | Ar, CR, CY, D, GS, R, T |
| Wingate Sandstone | | 250-330 | Sandstone, fine- to medium-grained, minor siltstone and shale | Pale-red to dark-orange | Ledgy appearance, flood-plain channel deposits, rare dinosaur tracks. | Ar, CR, CY, D, GS, R, T |
| | 100-400 | Sandstone, very fine to fine quartz grains, well sorted, chiefly calcareous cement | Light-brown to orange-brown | Forms prominent vertical cliff, large-scale cross-beds, "desert varnish" common on weathered faces. Ancient sand dune deposits. | Ar, CR, CY, D, T | |
| -continued next page- | | | -continued next page- | | -continued next page- | |

TERTIARY-QUATERNARY

CRETACEOUS

JURASSIC

San Rafael Group

Glen Canyon Group

J-0

| Unit | | Age m.y. | Thickness (feet) | Lithology | Color | Depositional Environment Other Attributes | Cross Reference (UGA Publication 28)* | | | | | |
|---------------|---|---------------|---------------------|--|---|--|--|-----------|---|--|---|-------------------------|
| J-0 | Chinle Formation | 205 | 460-1,195 | Sandstone, mudstone, siltstone, claystone, limestone, gritstone, and conglomerate | Red, orange, purple, green, and dark-brown | Changing rock types both laterally and vertically; channel-deposited basal Shinarump Member is discontinuous, thin and erodes into the underlying formation. Upper member deposited in a broad plain with lakes and streams; some freshwater limestones. | Ar, CR, CY, D, GS, T | | | | | |
| | Shinarump Member | | | | | | | | | | | |
| TR-3 | Moenkopi Formation | 227 | 270-500 | Siltstone, sandstone, claystone, limestone, and conglomerate; with minor gypsum in veins and blobs | Reddish-brown, yellow-gray, pale-green, white | Slope-former, flat continuous thin to medium beds; limestone beds locally fossiliferous (chiefly polychaetes). Transitional from marginal marine to non-marine (tidal mud flat). | Ar, CR, CY, D, GS, N, St, T | | | | | |
| Cutler Group | TR-1 | 248 | 0-150 | Sandstone, very fine to fine-grained, with medium to coarse grains; rounded, predominantly quartz, minor chert | White to yellowish-gray | In the Orange Cliffs the formation is divided into a lower eolian unit and an upper reworked marine unit (Huntoon and Chan, 1987). The lower unit is dominated by large-scale cross-beds with southeasterly dipping foresets. | CY, D, GS, St, T | | | | | |
| | White Rim Sandstone | | | | | | | | | | | |
| | Organ Rock Formation | | | | | | | 200-450 | Sandstone, fine-grained to silty, minor siltstone and sandy shale; Chiefly quartz with minor muscovite, magnetite, feldspar and chert | Reddish-brown with minor gray to green mottling. | Even, medium to thick bedded, forms steep slopes to ledgy cliffs. Formed in fluvial to coastal eolian environments. | CR, CY, D, N, St |
| | Cedar Mesa Sandstone | | | | | | | 700-1,400 | Sandstone, fine- to medium-grained, chiefly subangular quartz; minor coarse-grained sandstone, red siltstone, and limestone | Yellowish-tan to brown, red to east | Forms massive cliffs and broad slickrock benches with thin unconsolidated dunal deposits. Principally eolian with minor marine and fluvial deposits. Halgaito interfingers to the southeast, is silty, and deposited in distal streams near the sea's edge. | CR, CY, D, G, N, St |
| | Lower beds/Rico and Halgaito Formations | | | | | | | 0-500 | Limestone and sandstone; silty sandstone, fine- to medium-grained, calcareous, poorly sorted | Yellowish-tan to brown | Interbedded carbonates, sandstone, and minor shale, forms a ledgy outcrop; exposed only in the northern reach of GCNRA and in the eastern San Juan Arm. Marine to marginal marine environments. | Ar, CR, CY, D, G, N, St |
| Hermosa Group | 290 | PENNSYLVANIAN | 100-1,300 | Limestone with minor sandstone; calcareous, poorly sorted | Gray to tan | Red jasperized fossils, forms a vertical cliff; only the upper portion of the formation is exposed in the northern reach of GCNRA and in the eastern San Juan Arm. Chiefly marine carbonates with clastics from distant highlands. | Ar, CY, D, G | | | | | |
| | | | 100-1,800 | Limestone/dolomite/shale in San Juan Arm; chiefly evaporites (salt, potash, anhydrite) north and subsurface | Gray | Along San Juan River - platform carbonates and bioherms, abundant marine fossils, important reservoir rocks for oil in Paradox basin; northwest area, thick salts. | Ar, CY, G | | | | | |
| | | | 100-400 | Limestone, dolomite with some sandstone and shale | Gray | Subsurface only - possible exposure just outside GCNRA in the Goosenecks area of the San Juan River (Stevenson, 2000). | CY, G | | | | | |