Utah Geological Survey
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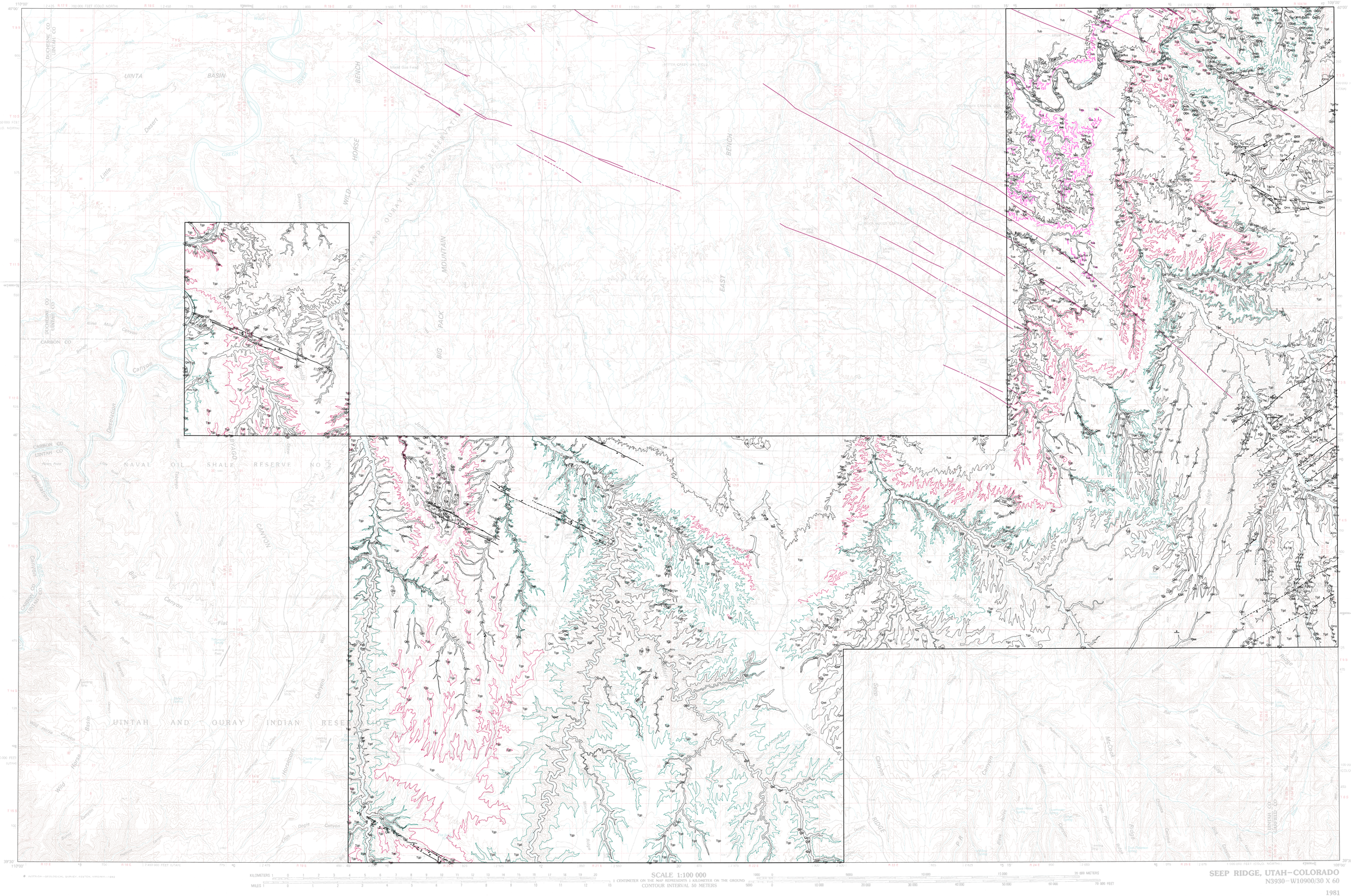
Utah Department of Natural Resources

Plate 1
Utah Geological Survey Open-File Report 507
Progress Report Geologic Map of Part of the Seep Ridge 30' x 60' Quadrangle, Uintah, Duchesne,
and Carbon Counties, Utah, and Rio Blanco and Garfield Counties, Colorado (Year 1 of 2)

SEEP RIDGE, UTAH–COLORADO

30 X 60 MINUTE SERIES (TOPOGRAPHIC)



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Progress Report Geologic Map of Part of the Seep Ridge 30' x 60' Quadrangle, Uintah, Duchesne, and Carbon Counties, Utah, and Rio Blanco and Garfield Counties, Colorado (Year 1 of 2)

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2007

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Plate 2
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Description of Map Units (italics indicate not on year 1 map)

Qal FLOOD-PLAIN AND CHANNEL ALLUVIUM (HOLOCENE) - Unconsolidated silt, sand, and gravel in flood plains of Green and White Rivers; locally grade into Qac; 1-30 m thick.

Qat TERRACE DEPOSITS (HOLOCENE) - Unconsolidated to locally cemented silt, sand, gravel, cobbles, and boulders; remnants of alluvial terraces along the Green and White Rivers; less than a few tens of meters thick.

Qaf ALLUVIAL-FAN DEPOSITS (HOLOCENE AND PLEISTOCENE) - Unconsolidated, poorly sorted boulder, gravel, sand, and silt; locally grade into Qac; less than 30 m thick.

Qac MIXED ALLUVIUM AND COLLUVIUM (HOLOCENE) - Unconsolidated mud, silt, sand, and gravel in intermittent stream drainages and in areas of low topographic relief; less than 10 m thick.

Qae MIXED ALLUVIUM AND EOLIAN DEPOSITS (HOLOCENE) - Unconsolidated alluvial mud, silt, and sand mixed with windblown sand and silt; less than 10 m thick.

Qe EOLIAN DEPOSITS (HOLOCENE) - *(Likely present in unmapped part of quadrangle and will be included in second year of project) Unconsolidated, well-sorted, fine-grained, windblown sand and silt; less than 10 m thick.*

Qc COLLUVIUM (HOLOCENE) - Heterogeneous mixture of boulders, gravel, cobbles, sand, and silt that may grade into talus, landslide, and alluvial deposits; less than a few tens of meters thick.

Qmtb TALUS DEPOSITS OF BURNED OIL SHALE (HOLOCENE) - Red, reddish-orange, and pink rock fragments of burned oil shale deposited below outcrops of the Mahogany oil-shale zone; includes colluvium locally; mapped in the Weaver Ridge quadrangle; less than a few tens of meters thick.

Qmt TALUS DEPOSITS (HOLOCENE AND PLEISTOCENE?) - *(Present in unmapped part of quadrangle and will be included in second year of project) Unconsolidated and unstratified angular rock fragments that accumulate at the base of cliffs; includes colluvium locally; less than 5 m thick.*

Qms SLIDES, SLUMPS, AND FLOWS (HOLOCENE AND PLEISTOCENE) - Earth flow and rotational slumps and slides in formations prone to slope failure; some Qms units may include significant colluvium and talus deposits; some Qms units may include mass movements of slightly different age or may share a common boundary with an adjoining mass movement.

Tub MEMBER B OF UINTA FORMATION (EOCENE) - Light-gray, light-greenish-gray, light-brown, and light-purple, mudstone and claystone with interbeds of greenish-gray, yellow, and brown fine-grained sandstone; contains minor conglomerate and tuffaceous beds; forms nonresistant slopes and thin resistant ledges; consists mostly of Horizon B of Osborn (1929), Peterson and Kay (1931), and Kay (1934); these beds are included in the informal Wagonhound member of some authors; contains significant gilsonite deposits; exposed thickness is less than 185 m.

Tua MEMBER A OF UINTA FORMATION (EOCENE) - Yellowish-gray and yellowish-brown, fine- to very fine grained sandstone and siltstone; contains minor conglomerate, shale, and tuffaceous interbeds; forms resistant beds; consists of Horizon A of Osborn (1929), Peterson and Kay (1931), and Kay (1934); these beds are included in the informal Wagonhound member of some authors; intertongues with the underlying Parachute Creek Member of the Green River Formation; the percentage of Green River beds increases westward across the quadrangle; may be equivalent to the sandstone and limestone facies of the Green River Formation in the west-adjoining Price 30′ x 60′ quadrangle (Weiss and others, 1990); the lower contact is irregular and bedding is contorted because of soft-sediment deformation; generally thins northward; 90-225 m thick.

Tgp PARACHUTE CREEK MEMBER OF GREEN RIVER FORMATION (EOCENE) - Moderately resistant, light- to medium-gray, light- to medium-brown, yellow, organic-rich marlstone, siltstone, sandstone, and oolitic limestone; contains pods of nahcolite, some of which have been leached leaving cavities; contains several oil shale beds including the Mahogany oil-shale zone; upper part intertongues with overlying Uinta Formation; thickens from southeast to northwest across quadrangle; 145-330 m thick.

Tgd DOUGLAS CREEK MEMBER OF GREEN RIVER FORMATION (EOCENE) - Soft to moderately resistant, light- to medium-gray, light- to medium-brown, yellow, and light-gray siltstone, sandstone, shale, and cherty and oolitic limestone; includes the distinctive reddish-brown, fine-grained sandstone, yellowish-brown marlstone, and bluish-gray to dark brown oil shale of the intertonguing unit locally mapped in the Dragon quadrangle (Scott and Pantea, 1985); base of member is mapped on the light-brown ostracodal limestone (0.6 m thick) of Long Point Bed (Johnson, 1984); may include upper part of the Green River-Wasatch Formations transition zone in Burnt Timber, Cooper Canyon, Bates Knolls, Agency Draw NE, and Agency Draw NW quadrangles where the Long Point Bed was not mapped; thickens from southeast to northwest across quadrangle; 60-670 m thick.

Tg-Tw GREEN RIVER-WASATCH FORMATIONS TRANSITION ZONE (EOCENE) - Intertonguing beds of Green River (lithotypes similar to Douglas Creek Member) and Wasatch Formations; includes unnamed tongue and Cow Ridge Member of the Green River Formation and Renegade Tongue and unnamed tongue of the Wasatch Formation; represents interval between the base of Long Point Bed and the main body of the Wasatch Formation; prone to slides, slumps, and flows along east margin of quadrangle; about 20-65 m thick.

Tw WASATCH FORMATION (EOCENE AND PALEOCENE[?]) - Red, yellow, and light-gray friable sandstone, siltstone, mudstone, and conglomerate; conglomerate is thin bedded and contains chert (black, brown, and gray) and quartzite pebbles; upper part intertongues with overlying Douglas Creek Member of Green River Formation where the transition zone is not identified; Wasatch Formation overlies Mesaverde Group in Davis Canyon quadrangle (Pantea, 1987) and base of Wasatch is at lowermost conglomeratic bed; lower part of Wasatch Formation may intertongue with underlying Flagstaff Member of Green River Formation where identified in the subsurface; about 305 m thick where exposed, but may be as much as 600 m in subsurface.

Kmv MESAVERDE GROUP, UNDIVIDED (UPPER CRETACEOUS) - Exposed part is moderately resistant, light-gray to pale-grayish-orange, fine-grained, lenticular cross-bedded sandstone with carbonaceous shale and thick coal beds of the Tuscher Formation; subsurface part is light-gray, tan, and light-yellow, cross-bedded sandstone with subordinate gray carbonaceous shale and minor coal of Farrer and Neslen Formations; likely includes beds of the Sego Sandstone, Buck Tongue of the Mancos Shale, and Castlegate Sandstone; exposed thickness 30 m.

THE FORMATIONS BELOW ARE IN THE SUBSURFACE ONLY IN THIS QUADRANGLE AND WILL BE SHOWN ON CROSS SECTIONS PLANNED FOR THE SECOND YEAR OF THE PROJECT. DESCRIPTIONS ARE FROM EXPOSURES IN THE ADJOINING VERNAL 30′ X 60′ QUADRANGLE (SPRINKEL, 2007) AND DUTCH JOHN 30′ X 60′ QUADRANGLE (SPRINKEL, 2006).

Kms *MANCOS SHALE (UPPER CRETACEOUS) - Dark-gray, soft, slope-forming calcareous shale containing beds of siltstone and bentonitic clay; 1360-1700 m thick.*

Kfd *FRONTIER SANDSTONE, MOWRY SHALE, AND DAKOTA SANDSTONE, UNDIVIDED - These formations are shown as one unit along part of the south flank of the Yampa Plateau; see below for descriptions and thickness; combined thickness of map unit is 75-235 m.*

Kf *FRONTIER SANDSTONE (UPPER CRETACEOUS) - Upper part resistant, light-brown to light-gray and yellow, fine-grained and ripple-marked sandstone with local petrified wood and fossils; lower part soft, light- to dark-gray calcareous shale; may include minor limestone and coal beds in the lower part; exposed thickness 50-85 m, but as much as 100 m thick in subsurface of Uinta Basin.*

Kmd *MOWRY SHALE AND DAKOTA SANDSTONE, UNDIVIDED - These formations are locally shown as one unit along Snake John Reef because they are too thin to show separately at map scale. See below for descriptions and thickness; combined thickness of map unit is 255-550 m.*

Kmr *MOWRY SHALE (UPPER AND LOWER CRETACEOUS) - Dark-gray, siliceous shale that weathers silver gray; contains abundant fossil fish scales; age based on Obradovich and Cobban (1975), Cobban and Kennedy (1989), Molenaar and Cobban (1991), and unpublished palynological data; 10-70 m thick.*

Kd *DAKOTA SANDSTONE (LOWER CRETACEOUS) - Upper and lower resistant, yellow and light-gray, medium- to coarse-grained sandstone beds separated by a carbonaceous shale; contains coal beds in exposures in the Vernal 30′ x 60′ quadrangle (Doelling and Graham, 1972); 15-80 m thick.*

KJcm *CEDAR MOUNTAIN FORMATION AND MORRISON FORMATION - Cedar Mountain is mapped with the underlying Morrision Formation because it is generally thin and the contact with the underlying Morrison is difficult to determine despite being a major unconformity representing about 25 Ma; combined thickness of map unit is 245-350 m.*

Cedar Mountain Formation (Lower Cretaceous) - Purple, gray, and greenish-gray mudstone, siltstone, minor sandstone and limestone; contains calcrete beds that weather out as carbonate nodules; 0-60 m thick.

Morrison Formation (Upper Jurassic) - Upper Brushy Basin Member consists of soft, banded, variegated (light-gray, olive-gray, red, and light-purple) shale, claystone, siltstone, and minor cross-bedded sandstone, conglomerate, and bentonite. Lower Salt Wash Member consists of resistant, light-gray to white, cross-bedded sandstone; dinosaur remains are preserved in the Salt Wash Member at Dinosaur National Monument; exposed thickness 245-290 m thick, but as thin as 160 m in subsurface.

Jsc *STUMP FORMATION, ENTRADA SANDSTONE, AND CARMEL FORMATION, UNDIVIDED - These formations are mapped as one unit where too thin to show separately at map scale; see below for unit description and individual formation thickness; combined thickness of map unit is 140-295 m.*

Js *STUMP FORMATION (UPPER JURASSIC) - Upper Redwater Member is greenish-gray and light-green, slope-forming shale with glauconitic, fossiliferous (belemnites) sandstone and limestone. Lower Curtis Member is resistant, light-gray to greenish-gray, cross-bedded, fossiliferous, glauconitic sandstone, oolitic limestone, and fissile shale; palynomorph assemblage from base of Curtis indicates Oxfordian age (Wilcox and Currie, 2006; Brian Currie, Miami University (Ohio), verbal communication, March 15, 2006); J-3 unconformity of Pipiringos and O'Sullivan (1978) is at base of Curtis Member; total thickness is 40-80 m.*

Je *ENTRADA SANDSTONE (MIDDLE JURASSIC) - Upper reddish-brown siltstone and fine-grained sandstone and a lower light-gray, pink, and light-brown sandstone; lower sandstone is resistant to erosion and forms cliffs and ridges; 15-75 m thick.*

Jc *CARMEL FORMATION (MIDDLE JURASSIC) - Medium- to dark-red, green, and gray sandy shale, sandstone, siltstone, limestone and gypsum; upper part is mostly slope-forming red shale, siltstone, and sandstone underlain by a middle gypsiferous unit; lower part is mostly red siltstone and thin, ledge-forming limestone, which is commonly oolitic and fossiliferous; 85-140 m thick.*

J'Rn *NUGGET SANDSTONE/GLEN CANYON GROUP (LOWER JURASSIC AND UPPER TRIASSIC) - Pink, light-gray, and light-brown, resistant, massive-weathering, large-scale cross-bedded sandstone; locally contains carbonate lenses (playa) and fluvial lenses (wadi) near top; forms cliffs and ridges; mapped as Navajo Sandstone prior to 1964 by several workers, however, the nomenclature was changed to Glen Canyon Sandstone by Poole and Stewart (1964) and adopted by several workers; I have restricted the Nugget Sandstone to the upper eolian beds and included the lower flat-lying sandstone and carbonate beds in the underlying Chinle Formation; vertebrate tracks of Jurassic age preserved in a fluvial lens near the top of Nugget Sandstone near Red Fleet Resevoir (Hamblin and others, 2000) in Dutch John 30′ x 60′ quadrangle; casts of vertebrate tracks of Late Triassic age are preserved on underside of base of typical Nugget Sandstone in this quadrangle near Dinosaur National Monument and at McConkie Ranch in Dutch John 30′ x 60′ quadrangle (Lockley and others, 1992); 155-275 m thick.*

Trcd *CHINLE, MOENKOPI, AND DINWOODY FORMATIONS, UNDIVIDED - Combined where formations are too thin to show at map scale; see below for descriptions and thickness; combined thickness of map unit is 255-550 m.*

Trc *CHINLE FORMATION (UPPER TRIASSIC) - Purplish-red, purple, light-gray, greenish-gray, light-green, ripple-marked siltstone, sandstone, claystone, shale, and conglomerate that locally contains abundant petrified wood; generally forms slopes; upper 26-36 m is light-reddish-brown planar laminated sandstone, cross-bedded sandstone, siltstone, and variegated mudstone that is correlated with Bell Springs Member of Nugget Sandstone by Jensen and Kowallis (2005); impressions of the vertebrate tracks of Late Triassic age (the mates of overlying casts found in overlying Nugget) may be preserved; base is resistant conglomerate unit named the Gartra Member; 85-125 m thick.*

Trmd *MOENKOPI AND DINWOODY FORMATIONS, UNDIVIDED - Combined as one map unit where formations are too thin to show separately at map scale; see below for descriptions and thickness; combined thickness of map unit is 170-425 m.*

Trm *MOENKOPI FORMATION (LOWER TRIASSIC) - Medium- to dark-red, reddish-brown, green, and gray, ripple-marked siltstone, fine-grained sandstone, and shale with gypsum and limestone beds; mostly "soft," slope-forming unit; 170-260 m thick.*

Trd *DINWOODY FORMATION (LOWER TRIASSIC) - Light-gray, greenish-gray, light-brown, and brown, thin-bedded, ripple-marked shale, siltstone, and sandstone with minor amounts of limestone. "Soft," slope-forming unit along the flanks of the Yampa Plateau; 0-165 m thick.*

Pp *PARK CITY AND PHOSPHORIA FORMATIONS (LOWER PERMIAN) - Combined thickness of Park City and Phosphoria Formations is 20-125 m.*

Franson Member of Park City Formation - Gray, thick- to thin-bedded cherty limestone and dolomite interbedded with brownish-gray sandstone and red to ochre shale; generally resistant and forms ledges and cliffs.

Meade Peak Phosphatic Shale Member of the Phosphoria Formation - Slope-forming, dark-gray phosphatic shale with interbeds of sandstone and limestone.

Grandeur Member of Park City Formation - Light-gray to light-brownish-gray sandstone, dolomite, and limestone; generally resistant and forms ledges and cliffs.

PIPw *WEBER SANDSTONE (LOWER PERMIAN TO MIDDLE PENNSYLVANIAN) - Light-gray to yellowish-gray, very thick bedded sandstone with interbeds of limestone in the lower part; highly cross-bedded sandstone in the upper part; forms steep cliffs and ridges; 230-475 m thick.*

IPm *MORGAN FORMATION (MIDDLE PENNSYLVANIAN) - Light- to medium-red, yellow, and gray shale and siltstone, light- to medium-gray fossiliferous and red cherty limestone, and light-red-gray, fine-grained, locally cross-bedded sandstone; 10-290 m thick.*

IPrv *ROUND VALLEY LIMESTONE (LOWER PENNSYLVANIAN) - Light-gray to light-blue-gray, thin- to very thick bedded limestone interbedded with soft, red shale; limestone is fossiliferous and cherty; chert is blue gray and yellowish gray, but red to pink jasperoid chert is common in the region; forms ledges and cliffs; only exposed in Split Mountain; 65-130 m thick.*

Mdh *DOUGHNUT SHALE AND HUMBUG FORMATION (UPPER MISSISSIPPIAN) - Combined thickness of map units is 160-185 m; only exposed in Split Mountain.*

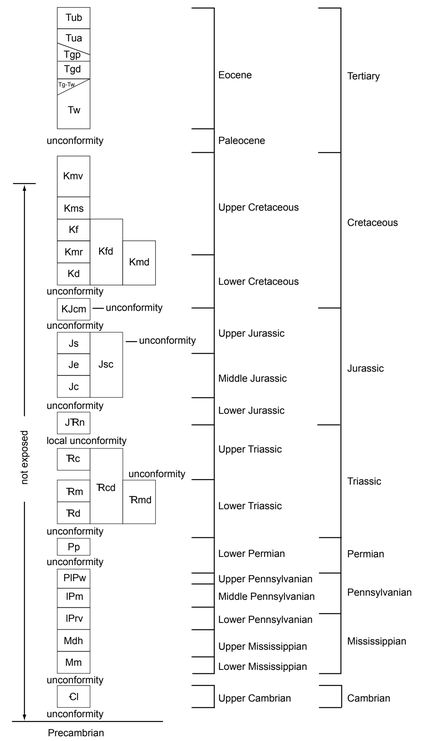
Doughnut Shale - Dark-gray shale, with some red shale near base, with beds of coarse sandstone, limestone, and "coal;" shale is slope forming and clayey; only exposed in Split Mountain; 85-95 m thick.

Humbug Formation - Light-gray to red, fine-grained to very fine grained, "soft" to resistant sandstone interbedded with light-gray limestone and red to black shale; sandstone is locally cross-bedded and hematitic near top of formation; 75-90 m thick.

Mm *MADISON LIMESTONE (UPPER AND LOWER MISSISSIPPIAN) - Mostly dark-gray, medium to coarse crystalline, cherty limestone; chert is typically light gray; regionally contains numerous caves and sinkholes; only exposed in Split Mountain; base not exposed, regionally 130-300 m thick.*

Cl *LODORE FORMATION (UPPER CAMBRIAN) - Light-brown to greenish-gray sandstone underlain by pink to tan to pale-greenish-gray glauconitic shale interbedded with tan to pale-green sandstone; base is variegated (pink, gray, and pale-green) coarse- to medium-grained cross-bedded sandstone; locally pebbly; Lodore pinches out to the west; 0-180 m thick.*

Correlation of Bedrock Units



Map Symbols

CONTACTS

TUFFACEOUS BED A
Yellowish-orange-weathering, tuffaceous unit mapped in the Southam Canyon quadrangle (Cashion, 1974) and Rainbow quadrangle (Keighin, 1977c); 1-2 m thick; about 55 m below top of member A of Uinta Formation.

TUFFACEOUS BED B
Brownish- to yellowish-orange-weathering, tuffaceous unit mapped near the top of Parachute Creek Member of Green River Formation only in Agency Draw NW quadrangle (Cashion, 1984).

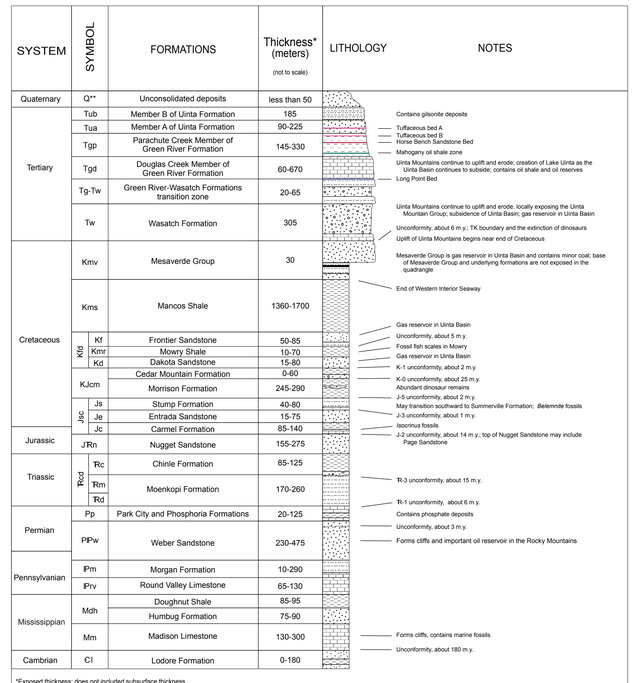
HORSE BENCH SANDSTONE BED
Brownish- to yellowish-orange, tuffaceous sandstone and siltstone interbedded with marlstone; about 1-15 m thick and about 100-135 m above the top of Mahogany oil-shale zone; may form prominent topographic bench; also mapped as tuffaceous unit by Cashion (1974, 1977), Keighin (1977a, 1977b, 1977c); incompletely mapped by Pipiringos (1978); mapped as base of contorted tuffaceous sequence by Scott and Pantea (1985).

MAHOGANY OIL-SHALE ZONE
Zone of rich oil-shale beds in the Parachute Creek Member of Green River Formation. The richest bed is the Mahogany "ledge", which is about 1-9 m thick (thins southeastward) and about 10-12 m below the top of the zone. The Mahogany oil-shale zone is about 20-30 m thick. The zone is about 150 m below top of Parachute Creek Member in the north and at or near the base of the Parachute Creek Member in the south.

FAULTS
Steeply dipping - Dashed where approximately located; dotted where concealed; queried where inferred; bar and ball on downthrown side where offset is known

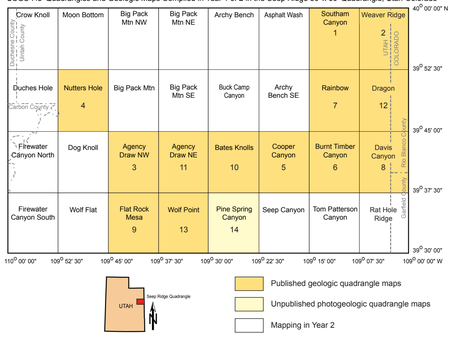
GILSONITE VEINS
Solid where exposed, dashed where approximately located, and dotted where concealed; locations from Boden, Tripp, and Rippy (2007, Utah Geological Survey unpublished mapping); Cashion (1974, 1977); Keighin (1977c); Pantea (1987); Scott and Pantea (1985).

Stratigraphic Column



*Exposed thickness; does not included subsurface thickness

USGS 7.5′ Quandrangles and Geologic Maps Compiled in Year 1 of 2 in the Seep Ridge 30′ x 60′ Quadrangle, Utah-Colorado



Published geologic quadrangle maps

Unpublished photogeologic quadrangle maps

Mapping in Year 2

Source of Map Data

1. Cashion, W.B., 1974, Geologic map of the Southam Canyon quadrangle, Uintah County, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-579, scale 1:24,000.
2. Cashion, W.B., 1977, Geologic map of the Weaver Ridge quadrangle, Uintah County, Utah, and Rio Blanco County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-824, scale 1:24,000; modified by Sprinkel for this map.
3. Cashion, W.B., 1984, Geologic map of the Agency Draw NW quadrangle, Uintah County, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-1717, scale 1:24,000.
4. Cashion, W.B., 1994, Geologic map of the Nutters Hole quadrangle, Uintah County, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-2250, scale 1:24,000.
5. Keighin, C.W., 1977a, Preliminary geologic map of the Cooper Canyon quadrangle, Uintah County, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-874, scale 1:24,000.
6. Keighin, C.W., 1977b, Preliminary geologic map of the Burnt Timber Canyon quadrangle, Uintah County, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-875, scale 1:24,000.
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12. Scott, R.W, Jr., and Pantea, M.P., 1985, Preliminary geologic map of the Dragon quadrangle, Uintah County, Utah, and Rio Blanco County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-1774, scale 1:24,000.
13. Scott, R.W, Jr., and Pantea, M.P., 1986, Preliminary geologic map of the Wolf Point quadrangle, Uintah County, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-1839, scale 1:24,000.
14. Sprinkel, D.A., 2007, Photogeologic mapping of the Pine Spring Canyon quadrangle, Uintah County, Utah: Utah Geological Survey unpublished map, scale 1:24,000.

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