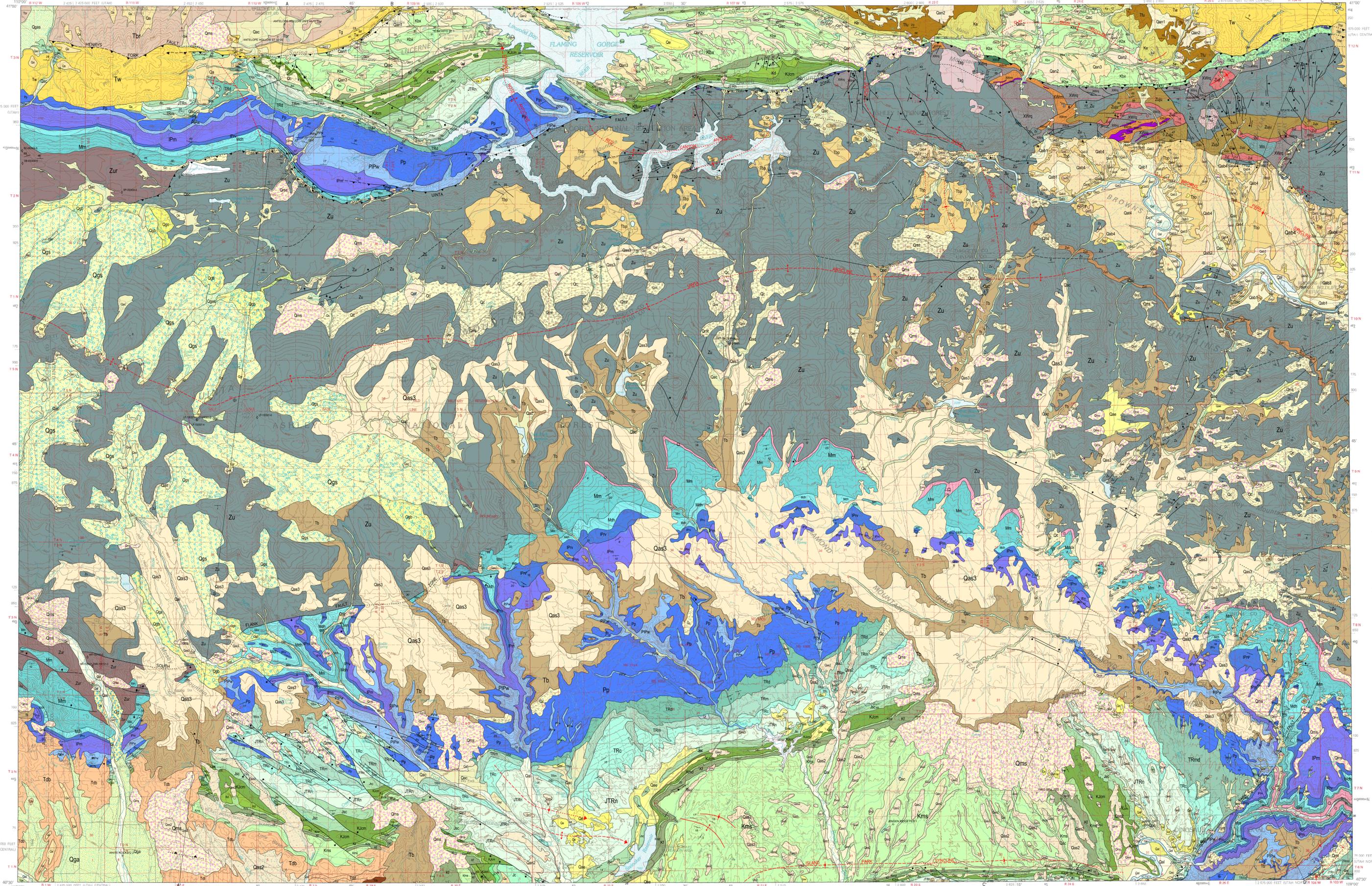


INTERIM GEOLOGIC MAP OF THE DUTCH JOHN 30' x 60' QUADRANGLE, DAGGETT AND Uintah COUNTIES, UTAH, MOFFAT COUNTY, COLORADO, AND SWEETWATER COUNTY, WYOMING

by
Douglas A. Sprinkel

DUTCH JOHN, UTAH-COLO.-WYO.

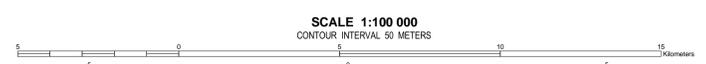
30 X 60 MINUTE SERIES (TOPOGRAPHIC)



Based from U.S. Geological Survey, 1981
Projection: UTM Zone 12
Units: Meters
Datum: NAD 1927
Spheroid: Clarke 1866

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This geologic map was funded by the Utah Geological Survey and the U.S. Geological Survey, National Cooperative Geologic Mapping Program, through USGS ST 1534A, award numbers USGS/AC0506, 01162-2-0210, 00KAG010, and 99AC02103. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.



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Description of Map Units

Qf	FILL - Material (earthen and concrete) used in dams for Steinkjer Reservoir and settling pond along Brush Creek as part of phosphate mining operations; not all fill material is mapped.	Qab3	OLDER BROWNS PARK PIEDMONT ALLUVIUM (UPPER PLEISTOCENE) - Unconsolidated to poorly consolidated, poorly sorted, reddish-brown matrix supported gravel with subangular to subrounded pebbles and cobbles; mapped in Browns Park and Little Hole and topographically above Qab2 deposit; generally corresponds to Qag3 of Counts (2005); greater than 6 m thick.	Tu	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 ledges and thin resistant ledges; 0-625 m thick; in cross section only on south flank of the Uinta Mountains.	Tmd	MOENKOPI AND DINWOWY FORMATIONS (LOWER TRIASSIC) - Shown as single map unit east of Brush Creek drainage because Dinwoody is less than 10 m thick and possibly interbedded with basal Moenkopi Formation (see Hansen, 1977; Rowley and others, 1981).
Qmf	DEBRIS-FLOW DEPOSITS (HISTORICAL) - Unconsolidated and poorly sorted heterogeneous mixture of boulders, gravel, sand, silt, and mud; matrix supported; deposited in Sheep Creek Canyon on June 9, 1965 (Sprinkel and others, 2003); less than 2 m thick.	Qat4	OLDER ALLUVIAL-TERRACE DEPOSIT (MIDDLE?) PLEISTOCENE - Distinct upper and lower units; upper unit is moderately sorted, clast-supported, sandy gravel with well-rounded pebbles and cobbles; lower units are poorly sorted, matrix-supported, tabular-bedded, subangular to well rounded boulder gravel; upper unit is mapped only in Browns Park and interpreted by Counts (2005) as a catastrophic flood deposit; deposit is 30-50 m above Qal; generally corresponds to Qag2 of Counts (2005); upper unit is 6-8 m thick and lower unit is 5 m thick.	Tq	GREEN RIVER FORMATION (EOCENE) - Soft to moderately resistant, light- to medium-gray, light- to medium-brown, yellow, and greenish-gray mudstone, organic-rich marlstone, silty sandstone, and silty limestone; on north flank of Uinta Mountains unit is Laney Shale Member; lower part intertongues with underlying Wasatch Formation and the upper part intertongues with the overlying Bridger Formation north of Uinta Mountains; 400-1173 m thick in the quadrangle, but thicker in basins to north and south.	Tm	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; 160-340 m thick.
Qal	FLOOD-PLAIN ALLUVIUM (HOLOCENE) - Unconsolidated silt, sand, and gravel mostly along Green River; 1-30 m thick.	Qab4	OLDEST BROWNS PARK PIEDMONT ALLUVIUM (MIDDLE PLEISTOCENE) - Unconsolidated to poorly consolidated, poorly sorted, brown matrix supported gravel with subangular to subrounded pebbles, cobbles, and scattered boulders; mapped in Browns Park and Little Hole and topographically above Qab3 deposit; generally corresponds to Qag4-7 of Counts (2005); greater than 6 m thick.	Tw	WASATCH FORMATION (EOCENE AND PALEOGENE?) - Red, yellow, and gray friable sandstone, siltstone, claystone, and conglomerate; upper part intertongues with overlying Green River Formation in Green River Basin north of quadrangle; conglomerate clasts consist of mostly gray limestone (Paleozoic), sandstone (Mesozoic), and some red sandstone and quartzite (Uinta Mountain Group); shown only in cross section on south flank; 600-1500 m thick.	Td	DINWOWY FORMATION (LOWER TRIASSIC) - Light-gray, light-green, light-brown, and brown, thin-bedded, ripple-marked shale, siltstone, and sandstone with minor amounts of limestone; mostly soft, slope-forming unit along south flank of Uinta Mountains in Ashley and Brush Creek drainages; Dinwoody Formation thins west of Ashley Creek drainage and is represented only by gypsum beds, and is not present in and west of Dry Creek drainage; 0-160+ m thick; tectonically thickened locally.
Qaf	YOUNGEST ALLUVIAL-FAN DEPOSITS (HOLOCENE) - Unconsolidated, poorly sorted boulder, gravel, sand, and silt; less than 30 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ttu	FORT UNION FORMATION (PALEOGENE) - Light-gray, light-brown, light-green, and brown sandstone, shale, and claystone with some carbonaceous shale, coal, siltstone, and conglomerate beds; inverse stratigraphy of Mesozoic through Paleozoic clasts in conglomerate beds and quartzite (Uinta Mountain Group); shown only in cross section on south flank; 600-1500 m thick.	Pp	PARK CITY AND PHOSPHORIA FORMATIONS (LOWER PERMIAN) - Combined thickness 20-30 m. Includes: 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. Grand Member of Park City Formation - Light-gray to light-brownish-gray sandstone, dolomite, and limestone; generally resistant and forms ledges and cliffs.
Qac	MIXED ALLUVIUM AND COLLUVIUM (HOLOCENE AND PLEISTOCENE) - Unconsolidated to moderately sorted mud, silt, sand, and gravel along channels of Green River tributaries, smaller streams, and intermittent streams; on Mancos Shale, unit is mostly reworked mud; less than 10 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	TKZ	UINTA FAULT ZONE ROCKS (TERTIARY AND UPPER CRETACEOUS) - Broken rock derived mostly from the hanging wall that ranges from recognizable rock fragments to catclastite and gneiss; fault zone varies from a few meters to about one kilometer in width.	PPW	WEBER SANDSTONE (LOWER PERMIAN TO MIDDLE PENNSYLVANIAN) - Light-gray to yellowish-gray, thin- to very thick bedded sandstone with interbeds of limestone in the lower part; highly cross-bedded sandstone in the upper part forms steep cliffs and ledges; 186-472 m thick.
Qae	MIXED ALLUVIUM AND EOLIAN DEPOSITS (HOLOCENE) - Unconsolidated alluvial mud, silt, and sand mixed with well-sorted, fine-grained, windblown sand and silt; less than 10 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kmv	MESAVERDE GROUP (UPPER CRETACEOUS) - Shown on cross section only; includes: Ericson Sandstone, Rock Springs Formation, and Blair Sandstone on north flank; see below for descriptions and thicknesses; undivided and 280-800 m thick on south flank.	PMU	PENNSYLVANIAN AND MISSISSIPPIAN ROCKS, UNDIVIDED - Small fault blocks of carbonate rocks likely from Round Valley and Madison Limestones along the Uinta fault zone.
Qee	EOLIAN DEPOSITS (HOLOCENE) - Unconsolidated, well-sorted, fine-grained, windblown sand and silt; less than 10 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ke	ERICSON SANDSTONE (UPPER CRETACEOUS) - Resistant, light-gray, medium- to coarse-grained sandstone and lenses of conglomerate, with local thin beds of dark gray nonmarine shale; only mapped on north flank of Uinta Mountains; 88-275 m thick.	Pm	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; 11-290 m thick.
Qe	EOLIAN DEPOSITS (HOLOCENE) - Unconsolidated, well-sorted, fine-grained, windblown sand and silt; less than 10 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kru	ROCK SPRINGS FORMATION (UPPER CRETACEOUS) - Resistant, light-gray to pale-grayish-orange, fine-grained, cross-bedded sandstone with some carbonaceous shale and coal beds; only mapped on north flank of Uinta Mountains; 0-385 m thick; thin to east.	Pv	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; beds to red pink Jasperoid chert is common in the region; forms ledges and cliffs; 65-125 m thick.
Qc	COLLUVIUM (HOLOCENE) - Heterogeneous mixture of boulders, gravel, cobbles, sand, and silt that may include in situ, landslide, and alluvial deposits; thin to a few tens of meters thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kbl	BLAIR SANDSTONE (UPPER CRETACEOUS) - Resistant, light-gray, pale-grayish-orange, thin- to thick bedded sandstone with interbedded gray marine shale; pinches out eastward becoming a tongue in Baxter Shale near the Glades; only mapped on north flank of Uinta Mountains; 0-110 m thick.	Mdh	DOUGHLASS SHALE AND HUMBUG FORMATION (UPPER MISSISSIPPIAN) - Combined thickness 160-181 m. Doughlass Shale - Dark-gray shale, with some red shale near base, with beds of coarse sandstone, limestone and organic shale; shale is slope forming and clayey; 24-91 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 has a granitic near top of formation; may contain caves and sinkholes along the south flank of the Uinta Mountains; 30-90 m thick.
Qm1	TALUS DEPOSITS (HOLOCENE AND PLEISTOCENE) - Unconsolidated and unstratified angular rock fragments on and at the base of steep slopes and cliffs; many larger deposits include protalus ramparts and are likely Pleistocene in age; smaller deposits in which colluvium locally is significant are likely Holocene in age; less than 5 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Km	MANCOS SHALE (UPPER CRETACEOUS) - Main body of the Mancos Shale; dark-gray, soft, slope-forming calcareous shale containing beds of siltstone and bentonitic clay; only mapped on south flank of Uinta Mountains; 1400-1700 m thick.	Mm	MADISON LIMESTONE (LOWER MISSISSIPPIAN) - Mostly dark gray, medium- to coarse crystalline, cherty limestone; chert is typically light gray; contains numerous caves and sinkholes; 130-300 m thick.
Qgr	ROCK GLACIER DEPOSITS (HOLOCENE AND PLEISTOCENE?) - Unconsolidated and unstratified angular rock fragments at the base of headwall cirques and have "rumped-carpet" look on aerial photographs; grade into talus deposits; less than 5 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kra	FRONTIER SANDSTONE (UPPER CRETACEOUS) - Upper part resistant, light-brown to light-gray and yellow, fine-grained and ripple-marked sandstone with local pebbled and invertebrate fossils; lower part soft, light- to dark-gray calcareous shale; locally includes minor limestone (with bivalve coquina) and coal beds in the lower part; 36-85 m thick.	Ci	LODGE 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; upper part forms ledges, middle part forms slopes and ledges, and lower part forms cliffs; Lodre pinches out to west; 0-180 m thick.
Qms	SLIDES, SLUMPS, AND FLOWS (HOLOCENE AND PLEISTOCENE) - Earthflows slumps, and slides; some Qms units share a common boundary with adjoining mass movement.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Krb	BAXTER SHALE (UPPER CRETACEOUS) - Gray, soft, slope-forming calcareous shale containing numerous beds of fine-grained, ripple-marked sandstone and minor limestone; equivalent to Mancos Shale; only mapped on north flank of Uinta Mountains; 1890-2100 m thick.	Mn	MADISON LIMESTONE (LOWER MISSISSIPPIAN) - Mostly dark gray, medium- to coarse crystalline, cherty limestone; chert is typically light gray; contains numerous caves and sinkholes; 130-300 m thick.
Qat	ALLUVIAL-TERRACE DEPOSITS, UNDIVIDED (HOLOCENE AND PLEISTOCENE?) - Unconsolidated to locally cemented silt, sand, gravel, cobbles, and boulders; located along Green River in southeast part of map near Island Park; includes units mapped by Rowley and others (1981) as dissected fan deposits; deposits include several levels 10 to 60 m above Green River and less than a few tens of meters thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kms	MANCOS SHALE (UPPER CRETACEOUS) - Main body of the Mancos Shale; dark-gray, soft, slope-forming calcareous shale containing beds of siltstone and bentonitic clay; only mapped on south flank of Uinta Mountains; 1400-1700 m thick.	Cl	LODGE 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; upper part forms ledges, middle part forms slopes and ledges, and lower part forms cliffs; Lodre pinches out to west; 0-180 m thick.
Qa	PIEDMONT ALLUVIUM, UNDIVIDED (HOLOCENE AND PLEISTOCENE?) - Unconsolidated to poorly consolidated, poorly to moderately sorted sand, gravel, cobbles, and boulders; poorly developed soil profile with some pedogenic carbonate (caliche) coatings on undersides of clasts; mapped on north and east flank of Pico Mountain and east of Little Mountain along south boundary of map; correlation with other piedmont alluvium units uncertain; less than 3 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ktd	FRONTIER SANDSTONE, MOWRY SHALE AND DAKOTA SANDSTONE (UPPER AND LOWER CRETACEOUS) - Shown as one unit on north slope of Jensen Butte, north flank of Uinta Mountains, because formations are too thin to show separately at map scale. See below for descriptions and thicknesses.	Co	LODGE 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; upper part forms ledges, middle part forms slopes and ledges, and lower part forms cliffs; Lodre pinches out to west; 0-180 m thick.
Qan1	YOUNGEST NORTH FLANK PIEDMONT ALLUVIUM (HOLOCENE AND UPPER PLEISTOCENE) - Unconsolidated to poorly consolidated, poorly sorted sand, gravel, cobbles and boulders; poorly developed soil profile and stage I pedogenic carbonate (caliche) coatings on undersides of clasts; mapped on north flank of Uinta Mountains and topographically lowest of four North Flank piedmont alluvium units; less than 10 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kf	FRONTIER SANDSTONE (UPPER CRETACEOUS) - Upper part resistant, light-brown to light-gray and yellow, fine-grained and ripple-marked sandstone with local pebbled and invertebrate fossils; lower part soft, light- to dark-gray calcareous shale; locally includes minor limestone (with bivalve coquina) and coal beds in the lower part; 36-85 m thick.	Co	LODGE 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; upper part forms ledges, middle part forms slopes and ledges, and lower part forms cliffs; Lodre pinches out to west; 0-180 m thick.
Qan2	YOUNGER NORTH FLANK PIEDMONT ALLUVIUM (UPPER PLEISTOCENE) - Unconsolidated to poorly consolidated, poorly sorted sand, gravel, cobbles and boulders; poorly to well-developed soil profile and stage II pedogenic carbonate (caliche) coatings on undersides of clasts in upper 1-2 m of deposit; mapped on north flank of Uinta Mountains and topographically above Qan1; less than 10 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kg	MOWRY SHALE AND DAKOTA SANDSTONE (UPPER AND LOWER CRETACEOUS) - Locally shown as one unit along south flank of Uinta Mountains because formations are too thin to show separately at map scale. See below for descriptions and thicknesses.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qan3	OLDER NORTH FLANK PIEDMONT ALLUVIUM (MIDDLE PLEISTOCENE) - Unconsolidated to moderately consolidated, poorly sorted sand, gravel, cobbles and boulders; poorly to well-developed soil profile and stage II pedogenic carbonate (caliche) coatings on undersides of clasts; mapped on north flank of Uinta Mountains and topographically above Qan2; less than 10 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kmd	MOWRY SHALE (UPPER AND LOWER CRETACEOUS) - Dark-gray, siliceous shale that weathers silver gray; contains abundant fossil fish scales and disarticulated fish bones (Anderson and Kowallis, 2005); 10-75 m thick.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qan4	OLDEST NORTH FLANK PIEDMONT ALLUVIUM (MIDDLE PLEISTOCENE) - Unconsolidated to moderately consolidated, poorly sorted sand, gravel, cobbles and boulders; poorly to well-developed soil profile and stage III pedogenic carbonate (caliche) coatings on undersides of clasts; mapped on north flank of Uinta Mountains and topographically the highest of four North Flank piedmont alluvium units; less than 10 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kmr	MOWRY SHALE (UPPER AND LOWER CRETACEOUS) - Dark-gray, siliceous shale that weathers silver gray; contains abundant fossil fish scales and disarticulated fish bones (Anderson and Kowallis, 2005); 10-75 m thick.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qas1	YOUNGEST SOUTH FLANK PIEDMONT ALLUVIUM (HOLOCENE AND UPPER PLEISTOCENE) - Unconsolidated to poorly consolidated, poorly sorted sand, gravel, cobbles and boulders; poorly developed soil profile and stage I pedogenic carbonate (caliche) coatings on undersides of clasts; mapped on south flank of Uinta Mountains along lower Brush Creek and Island Park; topographically lowest of three South Flank piedmont alluvium units; less than 2 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Kms	MANCOS SHALE (UPPER CRETACEOUS) - Main body of the Mancos Shale; dark-gray, soft, slope-forming calcareous shale containing beds of siltstone and bentonitic clay; only mapped on south flank of Uinta Mountains; 1400-1700 m thick.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qas2	YOUNGER SOUTH FLANK PIEDMONT ALLUVIUM (UPPER PLEISTOCENE) - Unconsolidated to moderately consolidated, poorly sorted sand, gravel, cobbles and boulders; poorly to well-developed soil profile and stage II pedogenic carbonate (caliche) coatings of clasts in upper 1 m of deposit; mapped on south flank of Uinta Mountains from Island Park to Whitecross Canyon and topographically higher than Qas1; less than 3 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ktd	FRONTIER SANDSTONE, MOWRY SHALE AND DAKOTA SANDSTONE (UPPER AND LOWER CRETACEOUS) - Shown as one unit on north slope of Jensen Butte, north flank of Uinta Mountains, because formations are too thin to show separately at map scale. See below for descriptions and thicknesses.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qas3	OLDER SOUTH FLANK PIEDMONT ALLUVIUM (MIDDLE PLEISTOCENE) - Unconsolidated to poorly consolidated, poorly sorted, silt, sand, gravel, and cobble to boulder deposits; subangular to subrounded clasts dominated by quartz sandstone and quartzite of Uinta Mountain Group; mostly matrix supported with clast-supported channel deposits; well-developed soil profile with stage III-IV carbonate (caliche) cementation; some clasts coated with iron-manganese deposits; boulders are scattered on surface as lag deposit; best exposed at Mast Warner Reservoir, along south margin of Diamond Plateau, and in Dry Fork drainage where it underlies Smiths Fork Tilt; most typically "rests" on Bishop Conglomerate but does "rest" on pre-Bishop units in places; unit is 3-60 m thick by a fault, which forms a 10-km-long fault scarp along Pot Creek; 0-1000 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ktd	FRONTIER SANDSTONE, MOWRY SHALE AND DAKOTA SANDSTONE (UPPER AND LOWER CRETACEOUS) - Shown as one unit on north slope of Jensen Butte, north flank of Uinta Mountains, because formations are too thin to show separately at map scale. See below for descriptions and thicknesses.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qat1	YOUNGEST ALLUVIAL-TERRACE DEPOSITS (HOLOCENE) - Unconsolidated, well-sorted, silt, fine-grained sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; mapped in Browns Park and Little Hole; deposit less than 1 m above Qal; generally corresponds to Qag0 and Qag1 of Counts (2005); may be part of Green River flood plain; less than 3 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ktd	FRONTIER SANDSTONE, MOWRY SHALE AND DAKOTA SANDSTONE (UPPER AND LOWER CRETACEOUS) - Shown as one unit on north slope of Jensen Butte, north flank of Uinta Mountains, because formations are too thin to show separately at map scale. See below for descriptions and thicknesses.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qab1	YOUNGEST BROWNS PARK PIEDMONT ALLUVIUM (HOLOCENE) - Unconsolidated, moderately sorted, matrix supported silt, fine-grained sand, gravel, and subangular to subrounded pebbles; topographically lowest of four piedmont alluvium units mapped in Browns Park and Little Hole; generally corresponds to Qag2 of Counts (2005); less than 6 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ktd	FRONTIER SANDSTONE, MOWRY SHALE AND DAKOTA SANDSTONE (UPPER AND LOWER CRETACEOUS) - Shown as one unit on north slope of Jensen Butte, north flank of Uinta Mountains, because formations are too thin to show separately at map scale. See below for descriptions and thicknesses.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qat2	YOUNGER ALLUVIAL-TERRACE DEPOSITS (HOLOCENE AND UPPER PLEISTOCENE?) - Unconsolidated to poorly consolidated, well-sorted, silt, medium- to fine-grained sand, clast-supported gravel, and well-rounded pebbles and cobbles; mapped in Browns Park and Little Hole; deposit less than 20 m above Qal; generally corresponds to Qag2 of Counts (2005); less than 3 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ktd	FRONTIER SANDSTONE, MOWRY SHALE AND DAKOTA SANDSTONE (UPPER AND LOWER CRETACEOUS) - Shown as one unit on north slope of Jensen Butte, north flank of Uinta Mountains, because formations are too thin to show separately at map scale. See below for descriptions and thicknesses.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qab2	YOUNG BROWNS PARK PIEDMONT ALLUVIUM (HOLOCENE AND UPPER PLEISTOCENE?) - Unconsolidated to poorly consolidated, poorly sorted, matrix supported silt, sand, gravel, and cobbles; mapped in Browns Park and Little Hole and topographically above Qab1; generally corresponds to Qag2 of Counts (2005); less than 3-5 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ktd	FRONTIER SANDSTONE, MOWRY SHALE AND DAKOTA SANDSTONE (UPPER AND LOWER CRETACEOUS) - Shown as one unit on north slope of Jensen Butte, north flank of Uinta Mountains, because formations are too thin to show separately at map scale. See below for descriptions and thicknesses.	Zu	UINTA MOUNTAIN GROUP, UNDIVIDED (MIDDLE UPPER PROTEROZOIC) - Dark- to light-red, fine- to coarse-grained quartzite, limy, and feldspathic sandstone and quartzite; sandstone is thick to medium bedded; planar, contorted, and cross-bedding is preserved; some beds contain tool and groove marks, ripples, and mudcracks; contains considerable red, green, and dark-gray micaceous shale interbeds and some conglomerate; map unit divided where Outlaw Trail marker bed is mapped (Connor and others, 1988; De Grey, 2005; De Grey and Dehler, 2005); age based on polytomy from dark-gray shale (Sprinkel and Waanders, 2005); as much as 4500 m thick.
Qat3	OLD ALLUVIAL-TERRACE DEPOSITS (UPPER PLEISTOCENE) - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; poorly to moderately developed soil profile and stage II carbonate (caliche) coatings on undersides of clasts; mapped in Browns Park and Little Hole; deposit about 25-30 m above Qal; generally corresponds to Qag3 of Counts (2005); less than 3-5 m thick.	Qat5	OLDEST ALLUVIAL-TERRACE DEPOSIT (LOWER?) PLEISTOCENE - Unconsolidated to poorly consolidated, well-sorted, sand, clast-supported gravel, and imbricated, well-rounded pebbles and cobbles; well-developed soil profile with stage II carbonate (caliche) coatings of clasts; mapped in Browns Park; deposit more than 80 m above Qal; generally corresponds to Qag5-6 of Counts (2005); 5-10 m thick.	Ktd	FRONTIER SANDSTONE, MOWRY SHALE AND DAK		

