



DESCRIPTION OF MAP UNITS

QUATERNARY

Alluvial deposits

- Stream deposits (Holocene) Stratified, moderately to well-sorted sand, Qal₁ silt, clay, and pebble to boulder gravel in river channels and flood plains; locally includes small alluvial-fan and colluvial deposits, and minor terraces as much as 10 feet (3 m) above current stream level; generally 0 to 20 feet (0-6 m) thick.
- Stream-terrace deposits (Holocene and upper Pleistocene) Stratified, Qat₂ moderately to well-sorted sand, silt, and pebble to boulder gravel that forms level to gently sloping terraces about 10 to 30 feet (3-9 m) above Deep Creek and Crystal Creek; because incision rates differ along the length of these streams throughout and beyond the quadrangle, age equivalency of Qat₂ deposits throughout the Zion National Park area is not known; deposited in river-channel and flood-plain environments; locally includes colluvial and alluvial-fan deposits too small to map separately; 0 to 30 feet (0-9 m) thick.
- Old stream deposits (middle to lower Pleistocene) Yellowish-brown, Qao moderately sorted sand, silt, and pebble to boulder gravel that forms isolated deposits as much as 1000 feet (300 m) above Deep Creek; prominent clasts include subrounded cobbles and boulders of Cretaceous fossiliferous sandstone, recycled, rounded pebbles and small cobbles of Precambrian and Cambrian quartzite, subrounded cobbles and boulders of basalt, uncommon, subrounded cobbles and boulders of early Tertiary Claron Formation limestone, and, locally, cobbles of Carmel Formation limestone; query indicates uncertain designation due to poor exposures and remote location; deposited in streamchannel environment; 0 to about 60 feet (0-20 m) thick.
- Alluvial-fan deposits (Holocene to upper Pleistocene) Poorly to Qaf₁ moderately sorted, poorly stratified, boulder- to clay-size sediment deposited as small alluvial fans along major drainages; level 1 deposits Qaf₂ form active depositional surfaces, although locally the fan's master stream is deeply entrenched; level 2 deposits form deeply incised inactive surfaces as much as 50 feet (15 m) above active drainages typically overlies and includes stream deposits (Qal₁) at the toe of he fans, and locally includes minor slope wash and talus along the upslope margins of the fans; generally 0 to 40 feet (0-12 m) thick.

Artificial-fill deposits

Artificial-fill deposits (historical) – Fill used to create a small stock Qf bond in the west-central part of the quadrangle and a landing strip at Burnt Flat; as much as 25 feet (8 m) thick.

Colluvial deposits

Qc

Qco

Colluvial deposits (Holocene to upper Pleistocene) - Poorly sorted, angular, clay- to boulder-size, locally derived sediment deposited principally by slope wash and soil creep; gradational with talus deposits and mixed alluvial and colluvial deposits; locally includes talus on slopes where colluvium and talus form a thin mantle that grades from one deposit to another; older colluvial deposits are mapped only at the south end of Miners Peak and consist of reworked old boulder gravel deposits; generally less than 20 feet (6 m) thick.

Eolian deposits

Eolian sand deposits (Holocene) - Well- to very well sorted, fine- to Qes medium-grained, well-rounded, frosted quartz sand derived from the Navajo Sandstone; mapped only on top of the Volcano Knoll lava flow near Virgin Flats; 0 to 6 feet (0-2 m) thick.

Mass-movement deposits

Landslide deposits, undivided (Holocene to middle[?] Pleistocene) -Qms Mass-movement complexes similar to both younger (Qmsy) and older (Qmso) mass-movement deposits, but not readily distinguishable; 0 to 200 feet (0-60+m) or more thick.

Landslide deposits (Historical to middle[?] Pleistocene) - Very poorly Qmsh sorted, clay- to boulder-size, locally derived material deposited by rotational and translational landslide movement; characterized by Qmsy hummocky topography, numerous internal scarps, and chaotic bedding attitudes; basal slip surfaces most commonly form in the lower unit Qmso of the Co-op Creek Limestone Member of the Carmel Formation, the Qmsc Cedar Mountain Formation, the Dakota Formation, and the upper unit ^₄(Kd)[∢] of the Straight Cliffs Formation, and the slides incorporate these and overlying map units: the Dakota Formation especially forms very large, complex mass movements; Qmsh denotes slides having historical movement; younger landslides (Qmsy) may have historical movement, but typically are characterized by slightly more subdued landslide features indicative of early Holocene to late Pleistocene age; older landslides (Qmso) are deeply incised and their main scarps and hummocky topography have been extensively modified by erosion. suggestive of late to possibly middle(?) Pleistocene age, but they too may be locally active; query indicates uncertain designation; Omso (Kd) denotes large, relatively coherent bedrock blocks of the Dakota

bed that caps the member; deposited in shoreface, lagoonal, estuarine, and flood-plain environments of a coastal plain (Laurin and Sageman 2001; Tibert and others, 2003); about 450 to 550 feet (135-170 m)

historica

prehistori

upper

middle

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Miocene

Upper

Lower

Middle

Lower

Upper

Middle

and

Lower

unconformity

Jīkm

J-0 unconformity

ΤRc

₹-3 unconformity

ΤRm

Tropic Shale (Upper Cretaceous, Turonian to Cenomanian) - Yellowishbrown and gray, slope-forming mudstone, fine-grained sandstone, and silty sandstone; basal mudstone locally characterized by a lag of septarian nodules; locally contains Inoceramus sp. fossils indicative of open shallow-marine environment (see, for example, Eaton and others, 2001); very poorly exposed, but forms subtle, vegetated slope at the base of the Straight Cliffs Formation and above the prominent "sugarledge sandstone" (Cashion, 1961) at the top of the Dakota Formation; upper contact placed at the base of the cliff-forming, planar beds of the Straight Cliffs Formation; deposited in shallow marine environment dominated by fine-grained clastic sediment (Tibert and others, 2003); thins westward across the quadrangle, from about 200 feet (60 m) thick near Cogswell Point to about 40 feet (12 m) thick south of Miners Peak; query indicates uncertain designation at Thorley Point where Tropic strata, if present, may be a few feet thick.

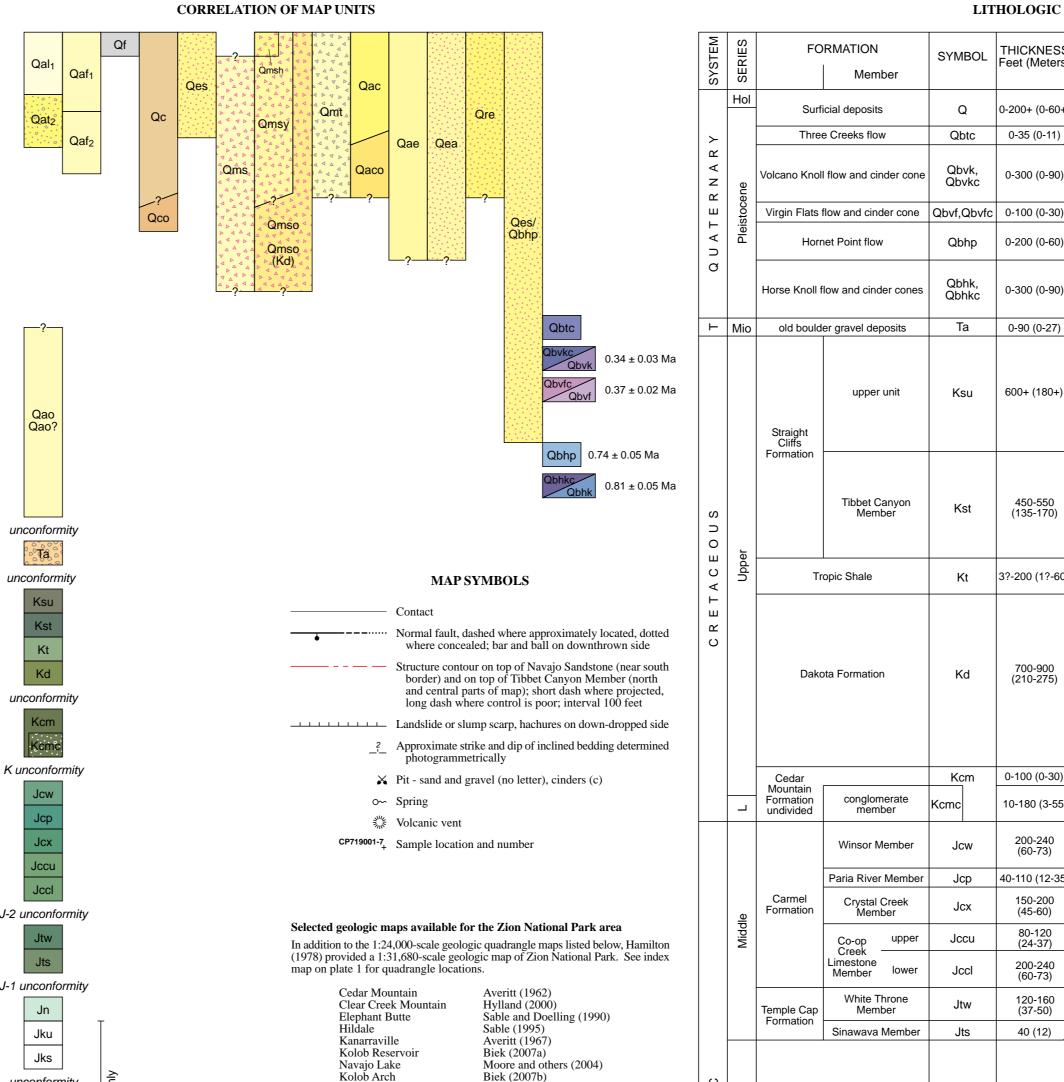
Dakota Formation (Upper Cretaceous, Cenomanian) - Interbedded, slope- and ledge-forming sandstone, siltstone, mudstone, claystone, carbonaceous shale, coal, and marl; sandstone is yellowish brown or locally white, thin to very thick bedded, fine to medium grained; includes two prominent cliff-forming sandstone beds each several tens of feet thick in the upper part of the formation, the upper one of which may correspond to the "sugarledge sandstone" of Cashion (1961); mudstone and claystone are gray to yellowish brown and commonly smectitic; oyster coquina beds, clams, and gastropods, including large Craginia sp., are common, especially in the upper part of the section; thin marl beds above the "sugarledge sandstone" locally contain small, distinctive gastropods with beaded edge Admetopsis n. sp. indicative of a latest Cenomanian brackish environment (Éaton and others, 2001) (for example, sample CPF61901-1 in section 35, T. 38 S., R. 10 W.); Dakota strata are typically poorly exposed and involved in large landslides; large blocks involved in rotational landslides are labeled Qmso(Kd); upper contact placed at the top of the thin marl beds overlying the "sugarledge sandstone"; deposited in a variety of flood-plain, estuarine, lagoonal, and swamp environments (Gustason, 1989; Laurin and Sageman, 2001; Tibert and others, 2003); invertebrate and palynomorph fossil assemblages indicate shallow marine, brackish, and fresh-water deposits of Cenomanian age (Nichols, 1995); about 700 to 900 feet (210-275 m) thick.

unconformity **Cedar Mountain Formation**

Kt

Cedar Mountain Formation, undivided (Cretaceous, Cenomanian to Albian) - Gray to variegated smectitic mudstone with minor light-gray to yellowish-gray fine-grained sandstone; near the base of this predominantly mudstone interval there is a distinctive, 1- to 4-foot-thick (0.3-1.2 m), locally ledge-forming, pale-olive to greenishgray, thin- to medium-bedded, fine- to medium-grained sandstone containing subangular, reddish-brown chert granules; east of Crystal Creek and Deep Creek, includes the basal conglomerate member (Kcmc), a 10-to 15-foot-thick (3-5 m), ledge-forming conglomerate that is generally too thin to depict separately in this area; except for thin conglomerate ledge at base, weathers to generally poorly exposed slopes covered with debris from the overlying Dakota Formation; upper contact is poorly exposed and corresponds to a color and lithologic change, from comparatively brightly colored smectitic mudstone below to gray and light-yellowish-brown mudstone and fine-grained sandstone above; regionally, the Cedar Mountain Formation is unconformably overlain by the Dakota Formation (see, for example, Kirkland and others, 1997); we obtained a single-crystal 40Ar/39År age of 97.9 ± 0.5 Ma on sanidine from a volcanic ash in Cedar Mountain mudstones in the Straight Canyon quadrangle to the east; recent pollen analyses indicate an Albian or older age for these beds (Doelling and Davis, 1989; Hylland, 2000); deposited in flood-plain environment of a broad coastal plain (Tschudy and others, 1984; Kirkland and others, 1997); previously mapped as the lower part of the Dakota Formation, but the lithology, age, and stratigraphic position of these beds suggest correlation to the Cedar Mountain Formation; 0 to 100 feet (0-30 m) thick.

Conglomerate member (Cretaceous, Cenomanian to Albian) - Thickto very thick bedded, yellowish-brown, channel-form conglomerate, pebbly sandstone, and pebbly gritstone; clasts are subrounded to rounded, pebble- to small-cobble-size quartzite, chert, limestone, and rare, reworked petrified wood; locally stained reddish-brown to dark-yellowish-brown; west of Volcano Knoll consists of a basal, ledge-forming pebbly conglomerate 10 to 15 feet (3-5 m) thick that grades upward to a grayish-orange to very pale-orange, noncalcareous, fine- to medium-grained quartzose sandstone and pebbly sandstone that has a "sugary" texture; this generally poorly cemented sandstone is characterized by low-angle cross-stratification with pebbles concentrated along cross-bed surfaces, and it contains a few thin, poorly exposed mudstone and siltstone intervals near the top of the unit; west of Crystal Creek and Deep Creek upper contact is poorly exposed and upper Cedar Mountain mudstone unit may be missing, but marks a change from yellowish-brown pebbly conglomerate or very pale-orange pebbly sandstone below (Kcmc) to yellowish-brown to gray mudstone and fine-grained sandstone above (Kd); east of these creeks, the contact between the thin lower conglomerate unit (Kcmc) and the upper mudstone unit (Kcm) is sharp, but this contact is not mapped due to problems of scale; deposited in river-channel environment on broad coastal plain (Tschudy and others, 1984; Kirkland and others, 1997); about 10 to 180 feet (3-55 m) thick.



Little Creek Mountain

Smithsonian Butte

Springdale East

Springdale West

Straight Canyon

The Barracks

Webster Flat

Virgin

Temple of Sinawava

The Guardian Angels

Smith Mesa

Utah Geological Survey Map 221 Geologic Map of the Cogswell Point Quadrangle

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adjacent to the Colorado Plateau, in Caputo, M.V., Peterson, J.A., and Franczyk, K.J., editors, Mesozoic systems of the Rocky Mountain region, USA: Denver

Formation as much as 200 feet (60 m) thick that slumped downsl under the influence of gravity and that are likely late to possibly middle(?) Pleistocene age.

Talus deposits (Holocene to upper Pleistocene) - Very poorly sorted, angular boulders and finer grained interstitial sediment deposited principally by rock fall on and at the base of steep slopes; typically grades downslope into colluvial deposits and may include colluvial deposits where impractical to differentiate the two; includes a thin, unmapped ribbon of alluvial deposits in the upper reaches of Deep Creek and West Fork; generally less than 30 feet (9 m) thick.

Mixed-environment deposits

Alluvial and colluvial deposits (Holocene to upper Pleistocene) - Poorly Qac to moderately sorted, generally poorly stratified, clay- to boulder size, locally derived sediments deposited principally in swales, small Qaco drainages, and the upper reaches of large streams by fluvial, slopewash, and creep processes; gradational with both alluvial and colluvial deposits; Qac deposits form active depositional surfaces and are generally less than 20 feet (6 m) thick; Qaco deposits are deeply ncised and of similar thickness.

Alluvial and eolian deposits (Holocene to Pleistocene) - Locally derived, Qae fine- to coarse-grained sand and silt with subangular to subrounded gravel; deposited in topographic depressions by slope wash and wind; ncludes small alluvial fans and colluvium along margins of deposits; locally conceals the Virgin Flats and Volcano Knoll flows; 0 to 20 feet (0-6 m) thick.

Eolian and alluvial deposits (Holocene to Pleistocene) - Locally derived, Qea fine- to medium-grained sand and silt with minor coarse sand and subangular to subrounded gravel; deposited in topographic depressions by wind and slope wash; includes small alluvial fans and colluvium along margins of deposits; locally conceals the Volcano Knoll flow; 0 to 20 feet (0-6 m) thick.

Residual and eolian deposits (Holocene to Pleistocene) - Reddish-Qre orange to pale-yellowish-gray, residual silt and fine sand with scattered residual, subangular gravel; forms discontinuous mantle over the Coop Creek Limestone; locally reworked by eolian processes; generally 0 to 10 feet (0-3 m) thick.

Stacked-unit deposits

Hornet Point lava flow and eolian sand deposits (Holocene to Pleis-Oes tocene) – Hornet Point lava flow that is partly covered by a mantle Qbhp of eolian sand and silt; eolian deposits are generally 0 to 10 feet (0-3 m) thick.

Volcanic rocks

Qbvf

Qbhp

Major- and trace-element geochemistry and ⁴⁰Ar/³⁹Ar raw data are available on the Utah Geological Survey Web site (http://geology. utah.gov/online/analytical_data.htm); rock names are after LeBas and others (1986).

Three Creeks lava flow (middle Pleistocene) - Medium to dark-gray, fine-grained olivine basalt lava flow; not dated, but probably less than 300.000 years old based on amount of incision adjacent to flow; erupted from one or more vents in the adjacent Webster Flat and Navajo Lake quadrangles; as much as 35 feet (11 m) thick.

Volcano Knoll lava flow and cinder cone (middle Pleistocene) -Medium- to dark-gray, fine-grained olivine basalt lava flow; sample CP71900-6 yielded $\frac{40}{\text{Ar}}$ Ar/39Ar plateau age of 0.34 ± 0.03 Ma; consists Qbvk of as many as seven cooling units that total as much as 300 feet (90 m) thick where it blocked the ancestral Deep Creek channel; erupted from vent at Volcano Knoll cinder cone (Qbvkc).

Virgin Flats lava flow and cinder cone (middle Pleistocene) - Mediumto dark-gray, fine-grained olivine basalt lava flow; sample CP71900-1 yielded ${}^{40}\text{Ar}/{}^{39}\text{Ar}$ plateau age of 0.37 \pm 0.02 Ma; erupted from vent Qbvf at unnamed cinder cone (Qbvfc) at the common border of sections 16 and 17, T. 39 S., R. 10 W.; maximum exposed thickness is about 100 feet (30 m).

Hornet Point lava flow (middle Pleistocene) - Medium- to dark-gray, medium- to coarse-grained olivine basalt to trachybasalt lava flow contains abundant pyroxene phenocrysts; locally deeply weathered to gruss-like soils and boulders typically have concentric weathering tinds; sample CP83100-3 yielded 40 Ar/ 39 Ar isochron age of 0.74 \pm 0.05 Ma; erupted from vent at deeply weathered cinder cone at Hornet Point in the Kolob Reservoir quadrangle (Biek, 2007a); as much as 200 feet (60 m) thick in this quadrangle.

Horse Knoll lava flow and cinder cones (lower Pleistocene) - Mediumto dark-gray, fine-grained olivine basaltic trachyandesite to trachybasalt lava flow; yielded a K-Ar age of 0.81 ± 0.05 Ma (Best and others, 1980); locally consists of at least eight cooling units that total about 300 feet (90 m) thick; erupted from vents at Horse Knoll and Pine Knoll in the adjacent Straight Canyon quadrangle and at least two smaller vents marked by cinder cones (Qbhkc) in this quadrangle.

unconformity

TERTIARY

Old boulder gravel deposits (Miocene) - Unconsolidated, very poorly **î î**a sorted, clay- to very large boulder-size sediment characterized by very large quartz monzonite boulders; quartz monzonite boulders as much as about 30 feet (10 m) in diameter constitute about 90% of the deposits; clasts also include large boulders of Claron Formation limestone to 18 feet (6 m) long, recycled, rounded pebbles and small cobbles of Precambrian and Cambrian quartzite, lesser Cretaceous sandstone boulders, and rare cobbles and boulders of pebbly sandstone of uncertain origin; except for the quartzite, most clasts are subangular unconformity (K) JURASSIC

Carmel Formation

Winsor Member (Middle Jurassic) - Light-reddish-brown, very fine to medium-grained sandstone and siltstone; uppermost beds typically bleached white: poorly cemented and so weathers to densely vegetated slopes, or, locally, badland topography; upper contact is the basal Cretaceous unconformity and in this quadrangle Winsor strata are everywhere overlain by pebbly conglomerate; deposited on a broad, sandy mudflat (Imlay, 1980; Blakey and others, 1983); about 200 to 240 feet (60-73 m) thick.

Paria River Member (Middle Jurassic) – Laminated to very thin bedded, light-gray argillaceous limestone and micritic limestone, and, locally, a basal, thick, white, alabaster gypsum bed; limestone weathers to small chips and plates, forms steep, ledgy slopes, and locally contains small pelecypod fossils; upper contact is sharp and planar; deposited in shallow-marine and coastal-sabkha environments (Imlay, 1980; Blakey and others, 1983); about 40 to 110 feet (12-35 m) thick.

Crystal Creek Member (Middle Jurassic) - Thin- to medium-bedded, reddish-brown, gypsiferous siltstone, mudstone, and very fine to medium-grained sandstone; typically friable and weakly cemented with gypsum; forms vegetated, poorly exposed slopes; upper contact is sharp and broadly wavy and corresponds to the base of a thick Paria River gypsum bed or argillaceous limestone interval; deposited in coastal-sabkha and tidal-flat environments (Imlay, 1980; Blakey and others, 1983); about 150 to 200 feet (45-60 m) thick.

Co-op Creek Limestone Member (Middle Jurassic) - Thin- to medium-bedded, light-gray micritic limestone and calcareous shale; locally contains Isocrinus sp. columnals, pelecypods, and gastropods; deposited in a shallow-marine environment (Imlay, 1980; Blakey and others, 1983).

Upper unit - Thin- to medium-bedded, light-gray micritic limestone; locally oolitic and sandy; forms sparsely vegetated, ledgy slopes and cliffs; upper contact is sharp and planar; about 80 to 120 feet (24-37 m) thick.

Lower unit - Mostly thinly laminated to thin-bedded, light-gray calcareous shale and platy limestone; forms steep, vegetated slopes; contact with upper unit is gradational and corresponds to a subtle break in slope and vegetation patterns; about 200 to 240 feet (60-73 m) thick.

Temple Cap Formation

White Throne Member (Middle Jurassic) - Very thick bedded, yellowish-gray to pale-orange, well-sorted, fine-grained quartz sandstone with large high-angle cross-beds; similar to the Navajo Sandstone; upper contact is sharp and planar and corresponds to the J-2 unconformity; deposited in coastal dune field (Blakey, 1994; Peterson, 1994); about 120 to 160 feet (37-50 m) thick.

Sinawava Member (Middle Jurassic) - Interbedded, slope-forming, moderate-reddish-brown mudstone, siltstone, and very fine grained silty sandstone; forms narrow, but prominent, deep-reddish-brown, vegetated slope at the top of the Navajo Sandstone; upper contact is gradational and interfingering with the White Throne Member; deposited in coastal-sabkha and tidal-flat environments (Blakey, 1994; Peterson, 1994); about 40 feet (12 m) thick

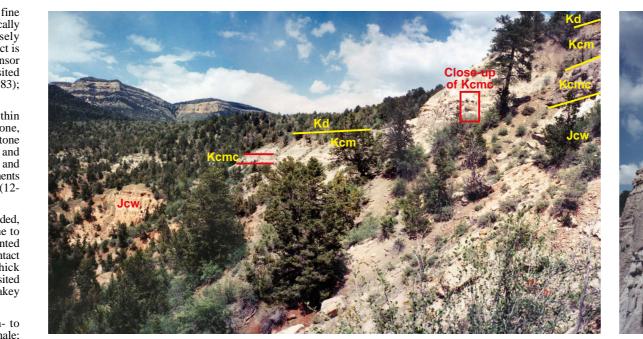
unconformity (J-1)

Jn

Navajo Sandstone (Lower Jurassic) - Massively cross-bedded, poorly to moderately well-cemented sandstone that consists of well-rounded fine- to medium-grained, frosted quartz; typically very light gray or white because of alteration and remobilization of limonitic and hematitic cement; locally moderate-reddish-orange to moderateorange-pink; contains rare planar interdune deposits; forms spectacular, sheer cliffs and is locally prominently jointed; upper, unconformable contact is sharp and planar and corresponds to a prominent break in slope, with cliff-forming, cross-bedded sandstone below and reddishbrown mudstone above; generally equivalent to the "white Navajo" as mapped in the Temple of Sinawava quadrangle (Doelling, 2002); deposited in a vast coastal and inland dune field with prevailing winds principally from the north (Blakey, 1994; Peterson, 1994); only the upper 840 feet (255 m) is exposed in the quadrangle, but the formation is about 2100 to 2200 feet (640-670 m) thick in the Zion National Park area.

Kaventa Formation

Marzolf (1994) and Blakey (1994) presented evidence to restrict the Moenave Formation to the Dinosaur Canyon and Whitmore Point Members, with a major regional unconformity at the base of the Springdale Sandstone. Further work supports this evidence, indicating that the Springdale Sandstone is more closely related to the Kayenta



View north-northeast to the Winsor Member of the Carmel Formation (Jcw) and newly identified Cedar Mountain Formation Close-up of Cedar Mountain conglomera (Kcmc and Kcm) along Crystal Creek in the south-central part of section 2, T. 39 S., R. 10 W. The poorly cemented Winsor Member ber (Kcmc) showing pebbly conglomerate, g ocally weathers to badland topography and its uppermost part is typically bleached white to light gray. The Cedar Mountain and thin sandstone interbeds that collect Formation includes a thin basal pebbly conglomerate member (Kcmc) with rounded quartzite and chert clasts that is overlain by gray to variegated smectitic mudstone (Kcm). The heavily vegetated Dakota Formation (Kd) unconformably overlies Cedar Mountain strata and typically forms large complex landslides. The Tibbet Canyon Member of the Straights Cliffs Formation forms about 15 feet (5 m) thick. Underlying Wins (Jcw) and overlying Cedar Mountain m (Kcm) are also shown. the bold cliffs on the skyline.

Biek (2007b) Hayden (2004) Sable and others (in preparation) Moore and Sable (2001) Doelling and others (2002) Willis and others (2002) Cashion (1967) Doelling (2002) Sable and Doelling (1993) Willis and Hylland (2002) Hayden (in preparation) Doelling and Graham (1972)		Lower	Navajo Sandstone Jn 2100-2200 (640-670)			Vertical cliffs Large, sweeping cross-beds			
			Kayenta Formation	upper unit	Jku	700-1000 (210-300)			
				Springdale Sandstone Member	Jks	100-150 (30-45)			
Sose-up of Cedar Mountain conglomerate mem- trockscowing pebbly conglomerate, gritstone, thin sandstone interbeds that collectively total at 15 feet (5 m) thick. Underlying Winsor strata a) and overlying Cedar Mountain mudstone n) are also shown.	TRIASSIC		Moenave F	ormation, undivided	JTRm	200-350 (60-105)			Shown on cross section only
		Upper	Chinle Formation, undivided		Ŧĸc	450-650 (135-200)			
		dle	Moenkopi F	ormation, undivided	Ŧĸm	1700-1800 (520-550)			

LITHOLOGIC COLUMN

LITHOLOGY

THICKNESS

Feet (Meters)

0-200+ (0-60+)

0-35 (0-11)

0-300 (0-90)

0-200 (0-60)

0-300 (0-90)

0-90 (0-27)

600+ (180+)

450-550

(135-170)

3?-200 (1?-60)

700-900

0-100 (0-30)

10-180 (3-55)

200-240

(60-73)

40-110 (12-35)

150-200

(45-60)

80-120

(24-37)

200-240

(60-73)

120-160

(37-50)

40 (12)

(210-275

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Qbtc

Qbvk

Obvkc

Qbhp

Qbhk

Obhko

Та

Ksu

Kst

Kt

Kd

Kcm

Jcw

Jcp

Jcx

Jccu

Jccl

Jtw

Jts

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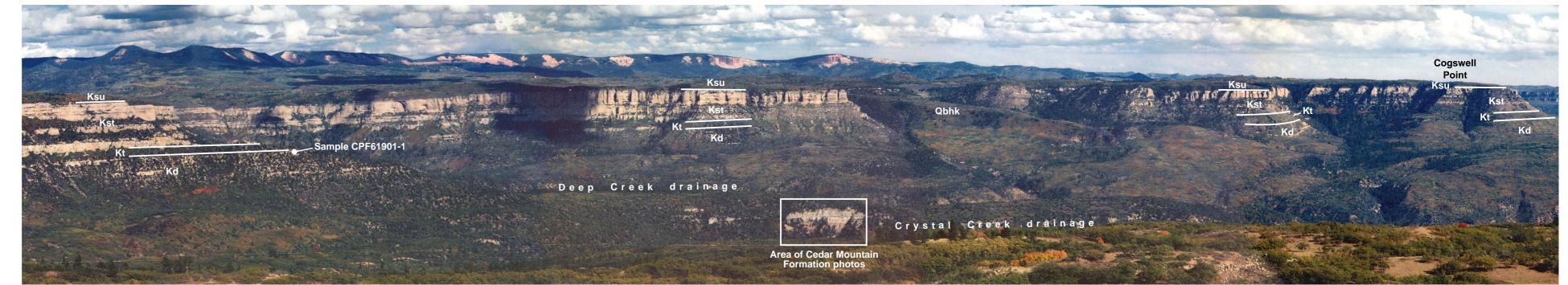
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View east across the Crystal Creek and Deep Creek drainages from below Thorley Point. The Tropic Shale (Kt) forms a westward-thinning, heavily vegetated slope at the base of the Tibbet Canyon Member of the Straight Cliffs Formation (Kst). The Dakota Formation (Kd) is locally exposed at the base of the cliffs, but typically forms large landslide complexes that cover most of the lowlands below. Sample CPF61901-1 from a thin marl bed at the top of the Dakota Formation yielded small, distinctive gastropods with a beaded edge (Admetopsis n. sp.) indicative of a latest Cenomanian brackish environment. The 800,000-year-old Horse Knoll basaltic lava flow (Qbhk) forms a classic inverted valley east of Deep Creek. The upper unit of the Straight Cliffs Formation (Ksu) is also shown. On the skyline northeast of the Cogswell Point quadrangle, the Tertiary Claron Formation forms the Pink Cliffs of the Markagunt Plateau

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