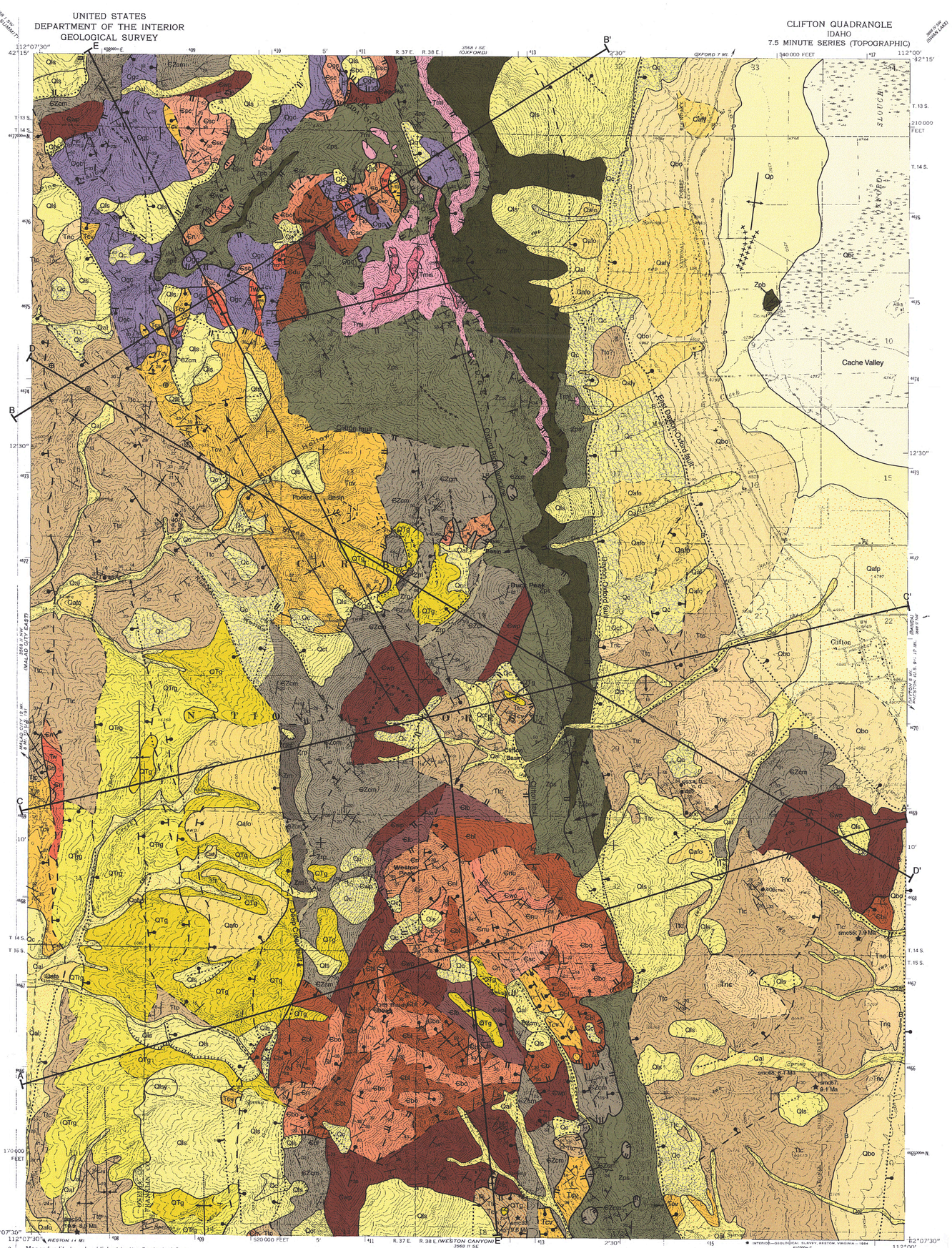
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Stephanie Carney, 2002, Evolution of a Miocene-Pliocene low-angle normal fault system in the southern Bannock Range, southeast Idaho [M.Sc. thesis]: Utah State University 170 p, 2 plates, scale 1:24,000.

Geologic map of the Clifton Quadrangle, Franklin and Oneida Counties, Idaho

2002

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Funding provided by the educational component of the U.S. Geological Mapping Program (EdMap).

Map from Carney, S.M., 2002, [M.S. thesis]: Utah State University, Logan, Utah

Description of Map Units

Quaternary

Qafy **YOUNGER ALLUVIAL FAN DEPOSITS** - Poorly sorted boulders, cobbles, pebbles, and fines that are post-Bonneville in age. Fans occur mostly on the east face Oxford Ridge, along the Oxford-Dayton fault.

Qafo **OLDER ALLUVIAL FAN DEPOSITS** - Poorly sorted boulders, cobbles, pebbles, and fines that are pre-Bonneville in age. These fans are primarily located on the east face of Oxford Ridge and west of Weston Peak in the west-central area of the Clifton quadrangle.

Qal **ALLUVIAL DEPOSITS** - Fine-grained to gravelly stratified sediment, primarily deposited in stream channels.

Qbo **PLEISTOCENE NEAR-SHORE SEDIMENTS OF THE BONNEVILLE LEVEL OF THE BONNEVILLE LAKE CYCLE** - deposits consist of cobbles, pebbles, and fines.

Qbr **HOLOCENE FLOOD-PLAIN AND ABANDONED MEANDERS OF THE ANCESTRAL BEAR RIVER** - These deposits consist mostly of fine grained, river sediments.

Qc **COLLUVIAL DEPOSITS** - Very coarse to fine rock debris and soil material.

Qct **COLLUVIAL AND TALUS DEPOSITS** - Very course to fine, angular rock debris and soil material.

Qls **LANDSLIDE DEPOSITS** - Composition is varied with parent material. These deposits may contain rotated blocks. Hachures indicate location of head scarp, where visible.

Qp **PLEISTOCENE NEAR-SHORE SEDIMENTS OF THE PROVO LEVEL OF THE LAKE BONNEVILLE CYCLE** -The deposit consists of mostly fines, with cobbles and pebbles.

Qafp **PLEISTOCENE NEAR-SHORE ALLUVIAL FAN DEPOSITS** - From the subaerial portion of the fan-delta at the mouth of Clifton Creek. These deposits are graded to the Provo level of the Bonneville lake cycle. They consist mostly of cobbles and pebbles, but also contain some fines.

QTg **QUATERNARY-TERTIARY (?) GRAVEL** - Thin alluvial fan deposits (?) overlying Quaternary-Tertiary roundstone gravel (QTrg) deposits and the Third Creek member of the Salt Lake Formation in the west and southwestern areas of the Clifton quadrangle. These gravels also overly Paleozoic and Neoproterozoic bedrock within the Clifton horst. The gravel deposits reflect lithogies of nearby sources. In Clifton Basin area the deposits are primarily composed of brecciated boulders and cobbles of Brigham Group quartzites. In the Weston Peak area the deposits are composed of brecciated and re-cemented Cambrian dolostones.

QTrg **QUATERNARY-TERTIARY ROUNDSTONE GRAVEL** - Thin, gravel deposits exposed south of Second Creek in the southwestern area of the Clifton quadrangle. The deposits are located in the hanging wall of the Deep Creek fault. The unit is composed of unlithified, uniformly well-rounded clasts consisting of mostly Brigham Group quartzites, Paleozoic carbonated and some recycled clasts from the Cache Valley Member of the Salt Lake Formation.

Tertiary

SALT LAKE FORMATION (Miocene - Pliocene)

Tnc **NEW CANYON MEMBER OF THE SALT LAKE FORMATION** (late Miocene and early Pliocene(?) - 4.4 to 5.1 Ma) Conglomerate exposed in the southeastern area of the Clifton quadrangle and north of Second Creek in the northwestern area of the Clifton quadrangle. Excellent consolidated exposures of this member northwest of the map area (in the Malad Summit quadrangle), west of Oxford Peak, show that the member is a parallel-bedded pebble to cobble conglomerate. The member is clast-supported and the clasts are uniformly well-rounded with no fining- or coarsening-upward sequences. Clasts consist of mostly Brigham Group quartzites, Paleozoic carbonates and some recycled clasts from the Cache Valley member of the Salt Lake Formation. The New Canyon member can be distinguished from the Third Creek member by its lack of tephras and freshwater limestones. Exact thickness of the New Canyon member is unknown in the map area. Reconnaissance mapping suggests that more than 1 km of section may be preserved west of Oxford Peak in the Malad Summit quadrangle to the north.

Ttc **THIRD CREEK MEMBER OF THE SALT LAKE FORMATION** (late Miocene - post-10.13 to pre-4.4 to 5.1 Ma) Interbedded conglomerates, primary and slightly reworked tephras, and limestones. This member is exposed on the eastern side of the Clifton horst in the hanging wall of the Oxford-Dayton fault. and on the western side of the Clifton horst in the hanging wall of the Deep Creek fault. It is also exposed within the Clifton horst in the south-central section of the Clifton quadrangle. It is composed mostly of poorly consolidated white to gray tephras, slightly tuffaceous and locally oolitic and fossiliferous limestones, medium to course-grained sandstones, and clast- and matrix-supported conglomerate. Matrix of the conglomerate is variably tuffaceous, sandy, and calcareous. Individual conglomerate beds range from < 50 cm to > 4 meters in thickness. Tephra and limestone beds vary from < 20 cm to > 2 meters. Clasts within conglomerate beds are generally subangular- to well-rounded pebbles, but a few beds contain cobbles. Clasts consist primarily of Brigham Group quartzites, Paleozoic carbonates and recycled Cache Valley member of the Salt Lake Formation. Minimum thickness of this member in the map area is 610 m.

Tcv **CACHE VALLEY MEMBER OF THE SALT LAKE FORMATION** (late Miocene - pre-10.3 to post-10.13) The majority of this unit is composed of slightly reworked tuffaceous sedimentary rocks, including mudstone, siltstone, limestone, silicified limestone, shale, sandstone, and rare pebbly conglomerates, as well as some primary tuffs and tephras. The Cache Valley member is primarily exposed on the west side of Oxford-Ridge in the hanging wall of the Clifton and New Canyon detachment faults. Color is variable, but light brown, off-whites, and light green rocks are most common. The rocks are generally characterized by a silica or clay cement and are more indurated than the tuffaceous rocks of the overlying Third Creek member of the Salt Lake Formation. Minimum thickness is 600 m in the map area.

Tmi **TERTIARY MAFIC INTRUSION** (Upper Tertiary?) Dark green, coarse-grained, metamorphosed diabase(?). According to Raymond (1971), the mafic intrusion is amphibolite with 50 percent hornblend and lesser amounts of epidote, chlorite, leucoxene, sericite, hematite, and clay. Our analysis showed abundant amounts of plagioclase. The pluton is located on Oxford Ridge in the northern area of the Clifton quadrangle. It forms a sill-like WSW-dipping tabular body that is parallel to Cenozoic foliation in the Neoproterozoic Pocatello Formation and appears to intrude and follow Tertiary low-angle normal faults. The upper-most part of the sill contains brittle fault rocks that are intruded by less deformed felsic restite of the mafic sill. This deposit has not been dated. It grossly resembles Miocene-Pliocene diabase dikes and sills that intruded the Tertiary Salt Lake Formation in the northeast and west-central Cache Valley (Willard, 1972; Winter, 1985; Biek et al., 2001).

Tmis **TERTIARY MAFIC INTRUSION - SHEARED** (Upper Tertiary?) Silvery-gray, medium- to fine-grained, sheared, metamorphosed mafic intrusion. Found in the deepest exposures of the pluton located on Oxford Ridge in the northern area of the Clifton quadrangle.

Tw **WASATCH FORMATION** (Paleocene and Eocene) A red sandy to conglomeratic deposit composed primarily of Paleozoic carbonate clasts. It is exposed in isolated fault-blocks west of Oxford Ridge and generally overlies the Ordovician Garden City Formation. The red matrix of this deposit easily distinguishes it from the overlying Cache Valley member of the Salt Lake Formation. The minimum thickness of the Wasatch Formation in the map area is 13 m, but it is as thick as 35m in the Malad City East quadrangle to the west and may be as thick as 200 m to the southwest in the

Silurian

SOf **FISH HAVEN DOLOMITE** (Lower Silurian and Upper Ordovician) - Dark gray to black dolomite with thin, light gray chert beds and some chert nodules. A small fault block of Fish Haven is exposed on Oxford Ridge in the Clifton quadrangle.

Ordovician

Ogc **GARDEN CITY LIMESTONE** (Middle and Lower Ordovician) - Gray, thin- to medium-bedded, fossiliferous limestone containing many intraformational conglomerate beds that sometimes weathers to a reddish color; black chert nodules abundant near the top. A complete section not exposed; minimum thickness estimated at 55 m.

Cambrian

Ecdu **CAMBRIAN DOLOSTONE UNDIFFERENTIATED** (Upper Cambrian) - Dark gray to light gray dolostone exposed in fault blocks on and west of Oxford Rigde in the Clifton quadrangle. These dolostones may be either the Cambrian Nounan Formation or Cambrian St. Charles Formation and very locally may include the Silurian-Ordovician Fish Haven Formation.

Esc **ST. CHARLES FORMATION** (Upper Cambrian) - The lower section consists of medium to thin-bedded, medium to dark gray limestone with interbeds of silicified siltstone and chert. Fossil hash is found throughout. The upper section consists of thick-bedded, coarsely crystalline, light to medium gray dolostone with local white to tan colored chert nodules and stringers. Complete section not exposed; minimum thickness estimated at 90 m.

Ewc **WORM CREEK QUARTZITE MEMBER OF THE ST. CHARLES FORMATION** (Upper Cambrian) - Gray to tan to pink arkosic sandstone with minor interbedded dolomite and limestone; quartzite beds have distinctive chalky-weathering feldspar grains. Minimum thickness is 19 m.

Enu **UPPER NOUNAN FORMATION** (Upper and Middle Cambrian) - Thin to medium bedded, medium to dark gray, silty limestone and light-gray, sugary dolomite with interbedded tan to red siltstone and fine-grained sandstone. A complete section is not exposed, but minimum thickness 490 m.

Enl **LOWER NOUNAN FORMATION** (Upper and Middle Cambrian) - Cliff-forming thick-bedded, coarsely crystalline, light to medium-gray, fenestral dolostone.

En **NOUNAN FORMATION, UNDIVIDED** (Upper and Middle Cambrian) - Mostly cliff-forming and ledge-forming, thin to thick bedded, dark to medium gray dolostone and medium to dark gray limestone with sparsely interbedded tan siltstone.

Ebo **BLOOMINGTON LIMESTONE** (Middle Cambrian) - The top of the unit consists of brown-weathering, slope-forming, light green and tan shale with interbedded , thin bedded, medium-gray limestone and intraformal limestone conglomerate. These shales contain distinctive green-gray, limestone nodules. The middle of the unit consists of ledge-forming, medium-bedded, medium to light-gray, locally oolitic limestone with interbedded, intraformal limestone conglomerate. The lower unit consists of brownish-orange weathering, slope forming, brownish-gray shale with interbedded, thin-bedded, oolitic limestone. A complete section is not exposed, but minimum thickness is 460 m.

Ebl **BLACKSMITH FORMATION** (Middle Cambrian) - Dark-gray, hackly weathering, cliff- to ledge-forming, limestone with minor interbedded, light-gray dolostone; exhibits light-gray to pale-orange silty bands and mottling, and is locally oolitic with few oncolites. A complete section is not exposed, but minimum thickness east of Weston Peak is 380 m.

Elb **LEAD BELL SHALE** (Middle Cambrian) - Slope-forming, light-gray, silty, oncolite-bearing limestone and tan, silty dolostone with interbedded tan and red fine-grained, micaceous siltstone and thin-bedded, silvery shale. This unit is equivalent to the Langston and Ute Formations of Utah stratigraphy. Thickness in the map area is unknown.

Ewp **WINDY PASS ARGILLITE** (Lower Cambrian) - Dark gray to brown, micaceous mudstone and siltstone, and dark brown weathering, gray quartzite. A complete section is not exposed, but minimum thickness in the south-central area of the Clifton quadrangle is estimated to be 300 m.

eZcm **CAMELBACK MOUNTAIN QUARTZITE** (Lower Cambrian and Upper Proterozoic) - Upper Camelback Mountain Quartzite Formation - light pink to white color with green partings, fine to coarse grained, vitreous sandstone. Lower Camelback Mountain Quartzite Formation - Dark pink to maroon color, liesegang banded, coarse-grained to pebbly sandstone and conglomerate at the base. Minimum thickness estimated to be 430 m.

Proterozoic

Zrp **ROCKY PEAK PHYLLITE MEMBER OF THE CAMELBACK MOUNTAIN QUARTZITE** (Upper Proterozoic) - Dark purple, fine-grained, micaceous siltstone with well developed cleavage and reduction spots. The Rocky Peak member is exposed in the Davis Basin area and on the southwest side of the Clifton horst near Old Baldy Peak in the Clifton quadrangle.

Zm **MUTUAL FORMATION** (Upper Proterozoic) - Maroon to pinkish purple, medium to coarse grained quartzite; locally conglomeratic with rare, dark purple, argillite interbeds. The Mutual Formation is exposed in the Davis Basin area and on the southwest side of the Clifton horst near Old Baldy Peak in the Clifton quadrangle. It is also exposed in a small fault block on Oxford Ridge. The base of the Mutual Formation is not exposed and thickness in map area unknown.

Zps **POCATELLO FORMATION - SCOUT MOUNTAIN MEMBER** (Neoproterozoic) - Slope and ledge forming, thick to massive bedded, brown and green diamictite, brown siltstone and sandstone and conglomerate metamorphosed to greenschists facies. The diamictite is a pebble to cobble-bearing, matrix supported mudstone to fine sandstone. Clasts of the diamictite are locally stretched. The Scout Mountain Member is exposed on the east side of the Clifton horst and on and west of Oxford Ridge.

Zpb **POCATELLO FORMATION- BANNOCK VOLCANIC MEMBER** (Neoproterozoic) - Ledge and cliff-forming, massive metavolcanic breccia and metabasalt. Metabasalt is a greenstone composed of chlorite, quartz, and epidote and contains pillow lavas and locally preserved vesicles.

Zps? **POCATELLO FORMATION - SHEARED SCOUT MOUNTAIN MEMBER ?** (Neoproterozoic) - Very sheared, phyllitic, light green weathering outcrop. The parallel foliation is so pervasive that the protolith is uncertain; either sedimentary or volcanic rocks may be the protolith. The Sheared Scout Mountain Member(?) is topographically and stratigaphically lower than the Bannock Voclanic member and is exposed on the east facing slope of Oxford Ridge.

Map symbols

FAULTS
Dashed where approximately located; dotted where concealed
Low-angle normal fault, double bar on downthrown side
High- to moderate-angle normal fault, primarily dip-slip; bar and ball on downthrown side
Lineament visable on aerial photographs, fracture or possible fault

FOLDS
Dashed where approximately located; dotted where concealed
Anticline; arrow at tip showing direction of plunge
Syncline; arrow at tip showing direction of plunge
Monocline; arrows at tips showing direction of plunge; arrow perpendicular to fold hinge denotes the steeper of the two adjacent limbs

CONTACT
Dashed where approximately located; dotted where concealed
Strike and dip of bedding
Strike and dip of bedding from S.S. Oriel's field map
Approximate strike and dip direction of bedding
Strike and dip of foliation
Bedding trace from aerial photographs
Head scarp of slump or slide
BONNEVILLE SHORELINE
Dashed where approximately located
PROVO SHORELINE
Dashed where approximately located

● 406 Location of paleocurrent data

smc68, 8.1 Ma ★ Tephra location, age, and sample number

Correlation of Map Units

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Published and sold by the Idaho Geological Survey
University of Idaho, Moscow, Idaho 83844-3014