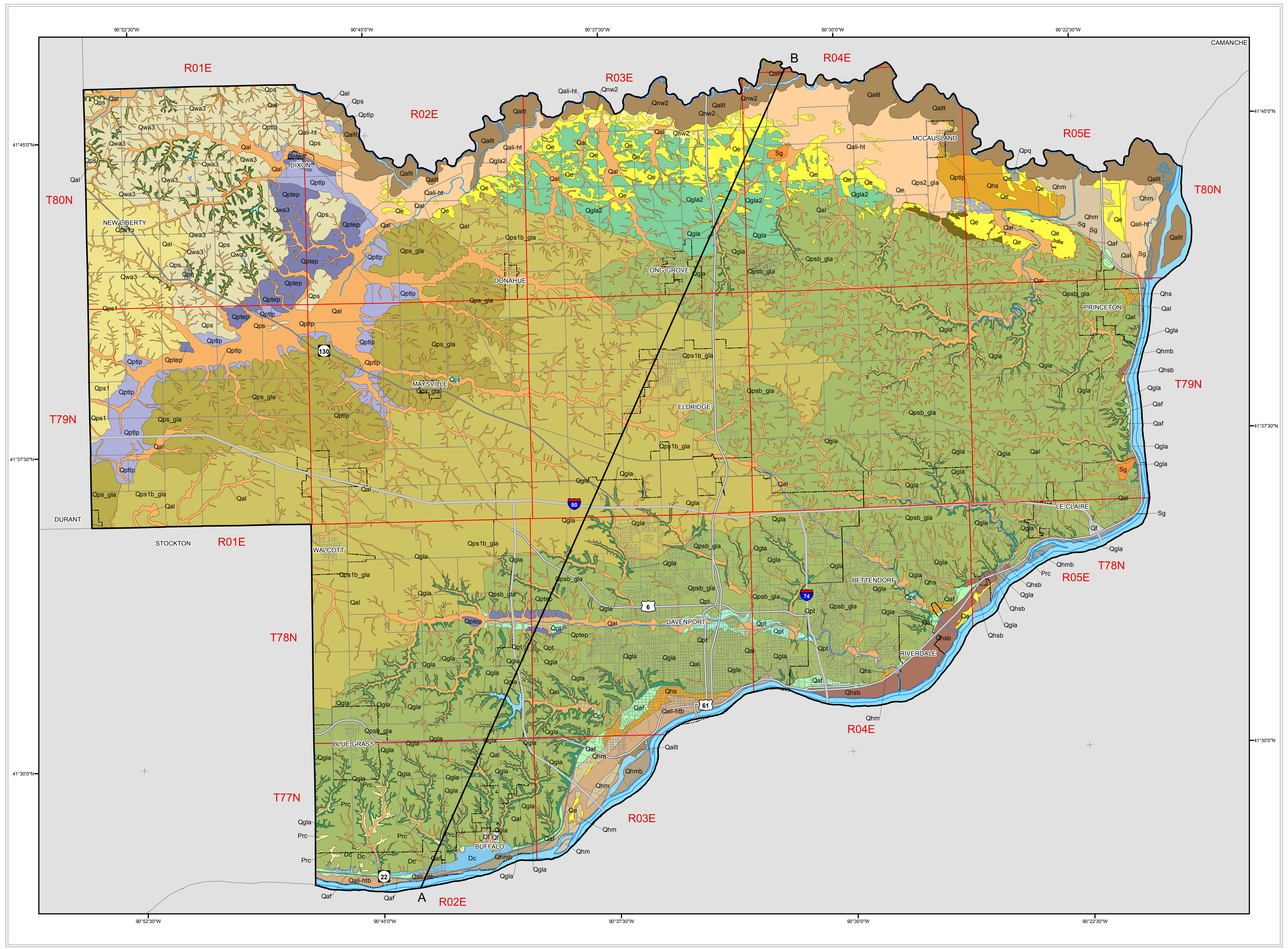
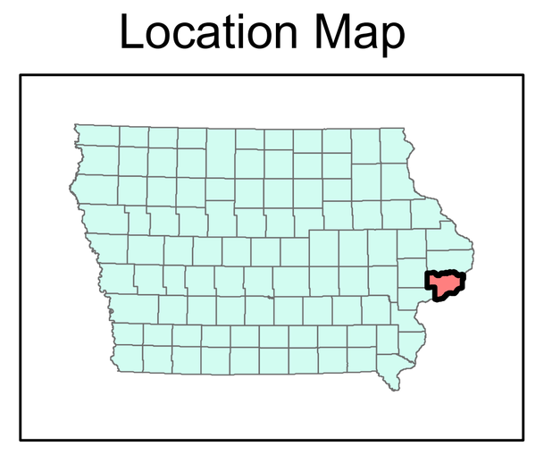
Surficial Geology of Scott County, Iowa



Location Map



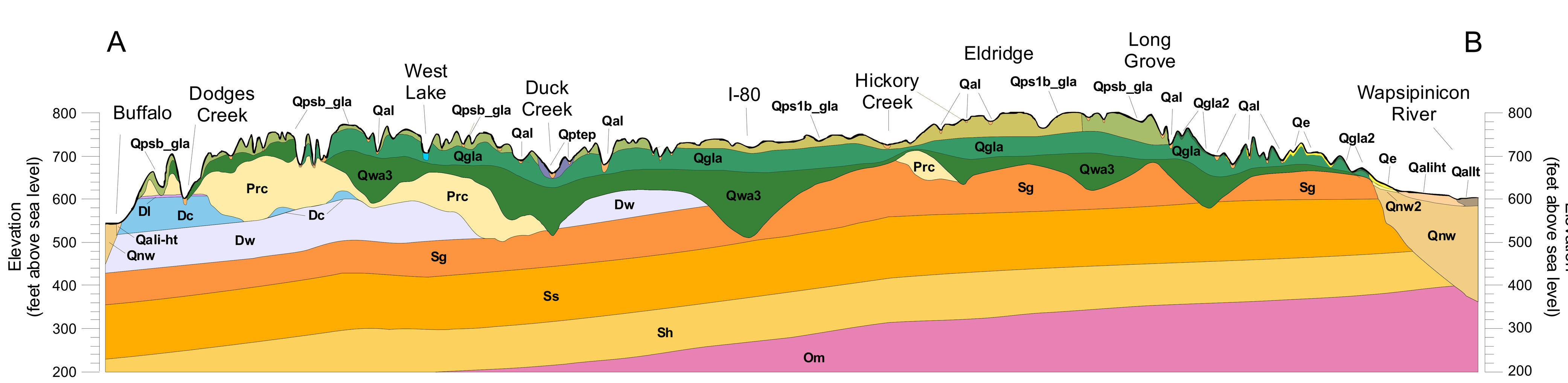
1:100,000

0 1 2 4 6 8 Miles

0 1 2 4 6 8 Kilometers

N

GEOLOGIC CROSS-SECTION A-B



LEGEND

CENOZOIC

QUATERNARY SYSTEM

HUDSON EPISODE

Qal - Alluvium (DeForest Formation-Undifferentiated) Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous to calcareous, stratified silty clay loam, clay loam, loam to sandy loam alluvium and colluvium in stream valleys, on hill slopes and in closed depressions. May overlie Glasford or Pre-Illinoian formation glacial till, Peoria Formation loess or eolian sand, or Noah Creek Formation 2 sand and gravel. Associated with low-relief modern floodplain, closed depressions, modern drainageways or toeslope positions on the landscape. Seasonal high water table and potential for frequent flooding.

Qallt - Wapsipinicon and Mississippi River Valley – Low Terrace (DeForest Formation-Camp Creek Mbr. and Roberts Creek Mbr.). Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous, stratified silty clay loam, loam, or clay loam, associated with the modern channel belt of the Wapsipinicon River valley. Overlies Noah Creek Formation 2. Occupies lowest position on the floodplain ie. modern channel belts. Seasonal high water table and frequent flooding potential.

Qali-ht - Wapsipinicon and Mississippi River Valley – Intermediate-High Terrace (DeForest Formation-Gunder Mbr.). Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous, silty clay loam to loam alluvium or colluvium. Overlies Noah Creek Formation 2 along the Wapsipinicon River or the Henry Formation along the Mississippi River. Occupies terrace and valley margin position 1 to 2 m (3-7 ft) above the modern floodplain. Seasonal high water table and low to moderate flooding potential.

Qali-htb - Mississippi River Valley – Intermediate-High Terrace (DeForest Formation-Gunder Mbr.). Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous, silty clay loam to loam alluvium or colluvium. Overlies Devonian Cedar Valley Group limestone along the Mississippi River near Buffalo. Occupies terrace and valley margin position 1 to 2 m (3-7 ft) above the modern floodplain. Seasonal high water table and low to moderate flooding potential.

Qaf - Alluvial fan (Corrington Mbr.) Variable thickness of 2 to 5 m (7-16 ft) of dark brown to yellowish brown, noncalcreous, silt loam to loam with interbedded lenses of fine sand and silts. A pebble lag is commonly found at or near the fan surface. Overlies thick sand and gravel of the Noah Creek Formation 2 (along the Wapsipinicon River) or Henry Formation (along the Mississippi River). Steep angled fans occur at the base of low order drainages and colluvial slopes along the northern margin of the Mississippi River Valley.

HUDSON AND WISCONSIN EPISODE

Qnw2 - Sand and Gravel (Noah Creek Formation) 2 to 8 m (7-26 ft) of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand and gravel with few intervening layers of silty clay. Along the Wapsipinicon River a thin mantle of loess, reworked loess, or fine-grained alluvium may be present. This unit includes silty colluvial deposits derived from the adjacent map units. In places this unit is mantled with 1 to 3 m (3-10 ft) of fine to medium, well sorted medium to fine sand derived from wind reworking of the alluvium. This unit encompasses deposits that accumulated in low-relief stream valleys during the Wisconsin and Hudson episodes. Seasonal high water table.

WISCONSIN EPISODE

Qe - Sand Dunes and Sand Sheets (Peoria Formation-sand facies) Generally less than 3 m (10 ft) of yellowish brown, massive, calcareous loamy sand to fine sand. It may overlie yellowish-brown coarse-grained sand and gravel (Noah Creek Fm. 2) or loamy Iowan Erosion Surface materials. Usually restricted to a narrow belt south of the Wapsipinicon River Valley.

Qnw - Sand and Gravel (Noah Creek Formation) Generally 8 m to 38 m (26 to 125 ft) of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand and gravel with few intervening layers of silty clay. This unit is shown only in cross section. It is buried by younger Hudson-age alluvial deposits associated with the Wapsipinicon and Mississippi River valleys. This unit encompasses deposits that accumulated in river valleys during the Wisconsin Episode.

Qhm - Outwash Sand and Pebbly Sand (Henry Formation, Muscatine Mbr.) coarse to fine sand and pebbly sand mantled with up to 1.5 m (5 ft) of eolian sand; Kingston Terrace complex in the Mississippi Valley.

Qhmb - Outwash Sand and Pebbly Sand Shallow to Bedrock (Henry Formation, Muscatine Mbr.) coarse to fine sand and pebbly sand mantled with up to 1.5 m (5 ft) of eolian sand; Kingston Terrace complex in the Mississippi Valley. Overlies Silurian Gower Formation fossiliferous dolomites of the Anamosa and LeClaire Members from the northern part of the quad to north of Bettendorf. From Bettendorf area south, the deposit is benched on Middle Devonian Wapsipinicon Group dolomite and limestone and or Lower Pennsylvanian Raccoon Creek Group shale, mudstone or sandstone.

Qhs - Outwash Sand and Pebbly Sand (Henry Formation, Sabula Mbr.) coarse to fine sand and pebbly sand mantled with up to 5 m (16 ft) of eolian sand; Savanna Terrace complex in the Mississippi Valley.

Qhsb - Outwash Sand and Pebbly Sand Shallow to Bedrock (Henry Formation, Sabula Mbr.) coarse to fine sand and pebbly sand mantled with up to 5 m (16 ft) of eolian sand; Savanna Terrace complex in the Mississippi Valley. Overlies Silurian Gower Formation fossiliferous dolomites of the Anamosa and LeClaire Members from the northern part of the quad to north of Bettendorf. From Bettendorf area south, the deposit is benched on Middle Devonian Wapsipinicon Group dolomite and limestone and or Lower Pennsylvanian Raccoon Creek Group shale, mudstone or sandstone.

Qpt - Loess Mantled Terrace (Peoria Formation–silt and/or sand facies) 2 to 7 m (7-23 ft) of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted, sand. May grade downward to poorly to moderately well sorted, moderately to well stratified, coarse to fine feldspathic quartz sand, loam, or silt loam alluvium (Late Phase High Terrace) or may overlie a Farmdale Geosol developed in Pisgah Silt which in turn overlies a well-expressed Sangamon Geosol developed in poorly to moderately well sorted, moderately to well stratified, coarse to fine sand, loam, or silt loam alluvium (Early Phase High Terrace). The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois.

Qptlp - Late Phase High Terrace (LPHT) (Peoria Formation-silt and/or sand facies) 2 to 7 m (7-23 ft) of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted, sand. Grades downward to poorly to moderately well sorted, moderately to well stratified, coarse to fine feldspathic quartz sand, loam, or silt loam alluvium.

Qptep - Early Phase High Terrace (EPHT) (Peoria Formation-silt and/or sand facies) 2 to 7 m (7-23 ft) of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted, sand. The Peoria deposits overlie a Farmdale Geosol developed in the Pisgah Formation which in turn overlies a well-expressed Sangamon Geosol developed in poorly to moderately well sorted, moderately to well stratified, coarse to fine sand, loam, or silt loam alluvium. The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois.

Qps - Loess (Peoria Formation—silt facies) Generally 2 to 8 m (7-26 ft) of yellowish to grayish brown, massive, jointed calcareous or noncalcareous silt loam to silty clay loam. Overlies a grayish brown to olive gray silty clay loam to silty clay (Pisgah Formation—eroded Farmdale Geosol) which is less than 1.5 m (5 ft) thick. The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois. The Farmdale Geosol appears to be disturbed by periglacial action and is welded to an older Sangamon Geosol developed in loamy glacial till of the Wolf Creek or Alburnett formations. This mapping unit encompasses upland divides, ridgetops and convex sideslopes. Well to somewhat poorly drained landscape.

Qps1 - Loess and Intercalated Eolian Sand (Peoria Formation-silt facies) 2 to 10 m (7-33 ft) of yellowish brown to gray, massive, fractured, noncalcareous grading downward to calcareous silt loam and intercalated fine to medium, well sorted, sand. Sand is most abundant in lower part of the eolian package- eolian dunes 0.5 to 2.5 m (2-8 ft) thick may be present at the base of this unit. Overlies massive, fractured, loamy glacial till of the Wolf Creek or Alburnett formations with or without intervening clayey Farmdale /Sangamon Geosol.

Qps-gla - Loess (Peoria Formation—silt facies) Generally 2 to 8 m (7-26 ft) of yellowish to grayish brown, massive, jointed calcareous or noncalcareous silt loam to silty clay loam. Overlies a grayish brown to olive gray silty clay loam to silty clay (Pisgah Formation-eroded Farmdale Geosol) which is less than 1.5 m (5 ft) thick. The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois. The Farmdale Geosol appears to be disturbed by periglacial action and is welded to an older Sangamon Geosol developed in loamy glacial till of the Glasford Formation. This mapping unit encompasses upland divides, ridgetops and convex sideslopes. Well to somewhat poorly drained landscape.

Qpsb-gla - Thick Loess (Peoria Formation- silt facies) Generally 5 to 15 m (16-49 ft) of yellowish to grayish brown, massive, jointed calcareous or noncalcareous silt loam to silty clay loam. Overlies massive, fractured, clay loam glacial till of the Glasford Formation with or without intervening clayey Farmdale Geosol and Pisgah Formation materials. The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois.

This mapping unit encompasses upland divides, ridgetops and convex sideslopes. Well to somewhat poorly drained landscape.

Qps1b-gla - Thick Loess and Intercalated Eolian Sand (Peoria Formation-silt facies) 5 to 15 m (16-49 ft) of yellowish brown to gray, massive, noncalcareous grading downward to calcareous silt loam and intercalated fine to medium, well sorted, sand. Minimum thickness of 5 m (16 ft) on uplands. Maximum thickness of 2-7 m (7-23 ft) of loess occurs on adjacent slopes. Overlies massive, fractured, loamy glacial till of the Illinoian Glasford Formation with or without intervening clayey Farmdale /Sangamon Geosol.

Qps2_gla - Eolian Sand and Intercalated Silt (Peoria Formation—sand facies) Generally five to fifteen meters (16 to 49 feet) of yellowish brown to gray, moderately to well stratified noncalcareous or calcareous, fine to medium, well sorted, eolian sand. May contain interbeds of yellowish brown to gray, massive, silt loam loess. Overlies massive, fractured, loamy glacial till of the Illinoian Glasford Formation with or without intervening clayey Farmdale /Sangamon Geosol.

Qgla2 - Loamy and Sandy Sediment Shallow to Glacial Till (Unnamed erosion surface sediment) 1 to 3 m (3-10 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty erosion surface sediment. Map unit includes some areas mantled with less than 2 m (7 ft) of Peoria silt or sand. Overlies massive, fractured, firm glacial till of the Illinoian Glasford Formation. Seasonally high water table may occur in this map unit.

ILLINOIS EPISODE

Qgla - Till (Glasford Formation) Generally 3 to 10 m (10-33 ft) of very dense, massive, fractured, loamy glacial till of the Illinoian Glasford Formation with or without a thin loess mantle (Peoria Formation—less than 2 m) and intervening clayey Farmdale/Sangamon Geosol. Uppermost till may be reworked (associated with the Iowan Surface). Drainage is variable from well drained to poorly drained.

PRE-ILLINOIS EPISODE

Qwa3 - Till (Wolf Creek or Alburnett formations) Generally 10 to 35 m (33-115 ft) of very dense, massive, fractured, loamy glacial till of the Wolf Creek or Alburnett formations with or without a thin loess mantle (Peoria Formation—less than 2 m) and intervening clayey Farmdale/ Sangamon Geosol. This mapping unit encompasses narrowly dissected interfluves and side slopes, and side valley slopes. Drainage is variable from well drained to poorly drained.

PALEOZOIC

PALEOZOIC ERATHEM

PENNSYLVANIAN SYSTEM

Prc - RACCOON CREEK GROUP (primarily Morrowan; locally includes Atokan-lower Desmoinesian Tradewater Formation in upper part). Recognized only in eastern Iowa in Scott and Muscatine counties; includes in ascending order the "Caseyville" and Tradewater formations. Rests unconformably on older map units in the county and fills paleovalleys and paleokarst developed in underlying Silurian and Devonian carbonate rocks. Primary lithologies are: shale/mudstone, light to dark gray, partly silty to sandy; sandstone, very fine to medium grained; siltstone, gray. Secondary lithologies are: carbonaceous shale/mudstone, gray to black; phosphatic black shale; limestone, dense, partly fossiliferous, partly sandy; coal (beds locally > 2 ft). Minor lithologies are: sandstone, coarse grained to granular, partly conglomeratic; mudstone, red to pink; limestone concretions (maybe septarian); cone-in-cone limestone; siderite/ironstone concretions and pellets; pyritic. Maximum thicknesses 195 ft (59 m).

DEVONIAN SYSTEM

Dl - LIME CREEK FORMATION (Upper Devonian, upper Frasnian). The formation is comprised entirely of the Sweetland Creek Shale in the southwest portion of the county. Primary lithologies are light green to brown shale, and green siltstone containing an abundant and diverse fossil conodont fauna. Maximum thickness to 12 ft (4 m).

Dc – CEDAR VALLEY GROUP (Middle-Upper Devonian, middle Givetian-lower Frasnian). The group includes in ascending order the Little Cedar, Coralville, and Lithograph City formations. Primary lithologies are: fossiliferous limestone, with an abundant and diverse invertebrate fauna, variably argillaceous, partly biostromal; and dolomite, partly fossil-moldic to vuggy, variably argillaceous. Maximum thickness of 85-90 ft (26-27 m) occurs in the southwest portion of the county near Buffalo.

Dw - WAPSIPINICON GROUP (Middle Devonian, upper Eifelian-middle Givetian). The group includes in ascending order the Bertram, Otis, and Pinicon Ridge formations. Primary lithologies are: dolomite, partly laminated, variably argillaceous, part fetid; and limestone, dense, "sublithographic", partly laminated to intraclastic; dolomite, fossil-moldic to vuggy (lower Otis fm). Secondary lithologies are: limestone/dolomite breccia (evaporite collapse, upper Pinicon Ridge Fm); dolomitic shale and shaly dolomite, gray to green-gray, partly silty-sandy; limestone, partly peloidal-oolitic to fossiliferous (Otis Fm). Minor lithologies are: chert and chalcedony nodules (Pinicon Ridge Fm); and sandstone, fine to medium with larger dolomite clasts (Bertram Fm). Maximum thicknesses of 112 ft (34 m).

SILURIAN SYSTEM

Sg - GOWER FORMATION (Lower-?Upper Silurian, Wenlock-?Ludlow). The formation includes Anamosa and LeClaire members; LeClaire Member can be a fossiliferous carbonate mound facies or a horizontally stratified fossil-moldic facies. Erosionally beveled and truncated beneath Dw. Primary lithologies are: laminated to stromatolitic dolomite (Anamosa Mbr), part fetid/organic; dolomite mudstone, dense, featureless. Secondary lithologies are: dolomite, fossiliferous to vuggy, moldic,; dolomite, partly coarsely crystalline, vuggy, fossiliferous to sparsely fossiliferous, part crinoidal and coralline (LeClaire Mbr). Minor lithologies are: chert; intraclastic dolomite. Maximum thickness occurs at LeClaire, 150 ft (46 m); thins to the southwest to 70 ft (21 m) at Blue Grass.

Ss - SCOTCH GROVE FORMATION (Lower Silurian, upper Llandovery-lower Wenlock). The formation includes the Johns Creek Quarry, Welton, Buck Creek Quarry, Waubeek, and Palisades-Kepler members. The bulk of the formation is comprised of the finely fossil-moldic Welton Member. Carbonate mound facies of the Palisades-Kepler Member are replaced laterally by inter-mound strata of the Waubeek Member. Everywhere overlain by Sg. Primarily lithologies are: dolomite, porous, fossil-moldic to vuggy, part very crinoidal (includes Welton Mbr); dolomite, cherty to very cherty, dense (Buck Creek Quarry Mbr). Secondary lithologies are: dolomite, sparsely fossil-moldic, dense, part vuggy (includes Waubeek Mbr); dolomite, coarsely crystalline, part very crinoidal (within Johns Creek Quarry and Palisades-Kepler mbrs); dolomite mudstone, dense. Minor lithologies are: dolomite, slightly argillaceous; quartz druse, chalcedony, silicified fossils. Maximum thicknesses of 150 ft (46 m).

Sh – HOPKINTON AND BLANDING formations (Lower Silurian, ?Rhuddanian, Aeronian-upper Llandovery. The Blanding Formation marks the base of the Silurian in the county and is overlain by the substantially thicker Hopkinton Formation. The map unit is at the bedrock surface only within the deeply buried bedrock valley (Cleona Channel) in the northern and western part of county. Primary lithologies are: dolomite, fossil-moldic to vuggy, fine to coarse crystalline; dolomite, dense to porous, cherty to very cherty, nodular to bedded chert (especially Blanding Fm). Maximum map-unit thicknesses of 110 ft (35 m); Hopkinton 95 ft (30 m); Blanding 15 ft (5 m). This unit is shown only in the cross section.

ORDOVICIAN SYSTEM

Om - MAQUOKETA FORMATION (Upper Ordovician; Richmondian [upper Katian]). The formation includes in ascending order the Elgin, Clermont, Fort Atkinson, and Brainard members. The map unit is at the bedrock surface only within the deeply buried bedrock valley (Cleona Channel) in the northern part of county. Primary lithologies are: shale, green-gray, variably dolomitic, mostly unfossiliferous; dolomite, argillaceous, partly shaly, variably fossiliferous; dolomite, partly argillaceous, partly cherty. Secondary lithologies are: shale, brown to brown-gray, organic, partly graptolitic, partly finely laminated (lower strata); interbedded dolomite and shale, partly fossiliferous. Minor lithologies are: dolomite, phosphatic, argillaceous (Elgin Mbr.). Maximum thicknesses of 210 ft (64 m). This unit is shown only in the cross section.

Qf – Fill Areas of major land filling. Fill associated with railroad grades, higway grades, and land leveling. Variable texture.

● **Drill Holes to Bedrock**

• **Water Well Records**

Introduction to the Surficial Geology of Scott County, Iowa

Scott County lies within a varied and unique surficial geologic region. Geomorphically, it contains the boundary between the Iowan Erosion Surface (IES) to the north and the Southern Iowa Drift Plain to the south (Prior and Kohrt, 2006). Stratigraphically, it contains Illinoian age glacial deposits, which are present only in a small area of southeastern Iowa. Surficial materials consist of a mix of thick eolian deposits (loess), loamy sediments associated with the IES, glacial till outcrop (both Illinoian and Pre-Illinoian), numerous sand and gravel deposits that may be very thick, terraces associated with both the Mississippi and Wapsipinicon rivers and several areas of shallow rock. Multiple periods of Quaternary glaciation and subaerial erosion have led to the landscape we see today. In general, the map area consists of loess and eolian sand of variable thickness overlying Illinoian and Pre-Illinoian glacial sediments.

Previous surficial geologic mapping has been completed as part of the STATEMAP program in Scott County (Quade et al., 2004 and 2005; Tassier-Surine et al., 2005, 2009a and 2009b) and to the west in adjacent Cedar County (Quade et al., 2008). The only other regional surficial map of the area consists of the Des Moines 4° x 6° Quadrangle at a scale of 1:1,000,000 (Hallberg et al., 1991). Norton (1899) first described and mapped the Quaternary and Paleozoic bedrock geology of the county, and discussed the stratigraphy of the Pennsylvanian, Devonian and Silurian strata that comprise the county's bedrock units. Statewide bedrock geologic maps by Hershey (1969), and most recently, by Witzke, Anderson, and Pope (2010), depict the increased understanding of the distribution of geologic units at the bedrock surface across this region.

At least seven episodes of Pre-Illinoian glaciation occurred in this region between approximately 2.2 and 0.5 million years ago (Boellstorff, 1978a,b; Hallberg, 1980, 1986). Episodic erosion during the last 500,000 years has led to the destruction of pre-existing glacial landforms associated with Pre-Illinoian glaciations. In east-central Iowa, Hallberg formally classified the units into two formations on the basis of differences in clay mineralogy: the Alburnett Formation (several undifferentiated members) and the younger Wolf Creek Formation (including the Winthrop, Aurora and Hickory Hills members). Both formations are composed predominantly of till deposits, but other materials are present. Paleosols are formed in the upper part of these till units.

A limited area of southeastern Iowa was glaciated during the Illinois Episode, around 300,000-130,000 years ago. Most of Scott County, with the exception of the area northwest of Mud Creek, was glaciated during this time. Leverett (1898, 1899) was the first to study the Illinoian glacial deposits in southeast Iowa. The Illinoian till was deposited by the advancing Lake Michigan Lobe which moved across western Illinois into Iowa from the northeast (Leverett, 1899; Wickham, 1980). The Lake Michigan Lobe incorporated Paleozoic bedrock materials from the Lake Michigan Basin which are distinguished by both the clay mineralogy of the matrix as well as the pebbles and clasts (Lineback, 1980; Wickham, 1980). Hallberg (1980b) defined the formal stratigraphic nomenclature in Iowa. The only Illinoian Episode till present in Iowa is the Glasford Formation Kellerville Till Member (Willman and Frye, 1970).

Following Pre-Illinoian glaciation, most areas of eastern Iowa underwent extensive erosion and landscape development and erosion until the Wisconsin Episode loess began to be deposited. A period of intense cold occurred during the Wisconsin full glacial episode from 21,000 to 16,500 years ago (Bettis, 1989). A periglacial environment prevailed during this period with intensive freeze-thaw action, solifluction, strong winds and a host of other periglacial processes (Walters, 1996). This cold episode and ensuing upland erosion led to the development of the distinctive landform recognized as the IES (Prior, 1976).

In eastern Iowa, the highly eroded and dissected Illinoian and Pre-Illinoian upland and older terraces are mantled by Wisconsin loesses of variable thickness (Ruhe, 1969; Prior, 1976). These sediments are the youngest regionally extensive Quaternary materials and were deposited between 30,000 and 12,000 years ago. Two loess units were deposited across eastern Iowa, the older Pisgah Formation and the younger Peoria Fm. The Pisgah is thin and includes loess and related slope sediments that have been altered by colluvial hillslope processes, pedogenic and periglacial processes. The unit is characterized by the presence of a weakly developed soil recognized as the Farmdale Geosol. It is not uncommon to see the Farmdale developed throughout the Pisgah and into the underlying older Sangamon Geosol. Most likely the Pisgah loess was deposited on the eastern Iowa landscape from 30,000 to 24,000 years ago (Bettis, 1989). The Pisgah Formation is typically buried by Peoria Formation loess. The Peoria Formation loess accumulated on stable landsurfaces in eastern Iowa from 25,000 to 21,000 years ago. The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois. The Peoria Formation consists of silt and sand facies.

Esling (1984) undertook a regional study of extensive post Illinoian-age alluvial deposits that had accumulated in major valleys in eastern Iowa. Three major terrace assemblages with differing stratigraphy and age were identified: Early Phase High Terrace (EPHT), Late Phase High Terrace (LPHT) and Low Terrace (LT). EPHT deposits are characterized by the presence of Peoria and Pisgah Formation sediments overlying Sangamon Geosol formed in the underlying alluvium. Esling theorized that these terraces are older than 40,000 years B.P. but younger than the Illinoian sediments in eastern Iowa (Bettis, 1989). LPHT deposits are characterized by the presence of Peoria Formation loess grading down into underlying alluvium with no paleosol. These terraces developed prior to 25,000 years ago and were buried by loess before 12,500 years ago. The LPHT terraces are typically inset into EPHT deposits. The LT is the youngest terrace and is not buried by Peoria loess. Terrace deposits are present primarily along Mud Creek and Duck Creek in the map area.

Surficial deposits of Scott County represent of seven formations: DeForest, Noah Creek (~Henry Fm. of Illinois), Peoria, Pisgah (~Roxanna Silt of Illinois), Glasford, Wolf Creek, and Alburnett formations as well as unnamed erosion surface sediments. Hudson-age deposits associated with fine-grained alluvial and colluvial sediments include the DeForest Formation which is subdivided into the Camp Creek, Roberts Creek, Gunder and Corrington members. The Noah Creek Formation includes coarse sand and gravel located along the Wapsipinicon River associated with the development of the Iowan Erosion Surface. Unnamed erosion surface sediments consist of reworked till and slopewash deposits formed by peri-glacial activity during the Wisconsin maximum and may be up to 25' thick. Peoria Formation eolian materials consist of loess and eolian sand of Peoria Formation materials are present throughout the majority of Scott County except on the area south of the Wapsipinicon River mapped as IES materials. Pisgah Formation loess is also present, being thicker near the Mississippi River and thinning to the west. The characteristics of the eolian deposits vary throughout Scott County. The southeast portion of the county adjacent to the Mississippi River is dominated by thick (up to 60') loess with almost no eolian sand. An adjacent band comprises the center of the county and is dominated by interbedded silt and fine sand. Areas adjacent to Mud Creek are dominated by loess up to 20' thick. A buried sand sheet is present in the northwest part of the map area

References

Anderson, W.I., and Garvin, P.L. (eds), 1984: The Cedar Valley Formation (Devonian), Black Hawk and Buchanan counties: Carbonate Facies and Mineralization, area. Geological Society.of Iowa, Guidebook 42, 47 p.

Anderson, R.R., and Bunker, B.J. (eds), 1998: Fossil shells, glacial swells, piggy smells, and drainage wells: the geology of the Mason City, Iowa, area. Geological Society.of Iowa, Guidebook 65, 71 p.

Belanski, C.H., 1927: The Shellrock Stage of the Devonian. American Midland Naturalist, v. 10, p. 316-370.

Bettis, E.A., III, 1989, Late Quaternary history of the Iowa River Valley in the Coralville Lake area *in* Plocher, O.W., Geologic Reconnaissance of the Coralville Lake area: Geological Society of Iowa Guidebook 51, p. 93-100.

Boellstorff, J., 1978a, North American Pleistocene Stages reconsidered in light of probable Pliocene-Pleistocene continental glaciation: Science, v. 202 p. 305-307.

Boellstorff, J., 1978b, Chronology of some late Cenozoic deposits from the central United States and the ice ages: Transactions of the Nebraska Academy of Science, v. 6, p. 35-49.

Day, J., Luczaj, J., and Anderson, R. (eds), 2006: New perspectives and advances in the understanding of lower and middle Paleozoic epeiric carbonate depositional systems of the Iowa and Illinois basins, In Guidebook for the 36th Annual Field Conference of the Great Lakes Section, Society for Sedimentary Geology (SEPM) and the 67th Annual Tri-State Field Conference, September 29 – October 1, 2006, 167 p.

Esling, S.P., 1984, Quaternary stratigraphy of the lower Iowa and Cedar River valleys, southeast Iowa: University of Iowa, Iowa City, unpublished Ph.D Dissertation, 451p.

Groves, J.R., Walters, J.C., and Day, J. (eds), 2008: Carbonate platform facies and faunas of the Middle and Upper Devonian Cedar Valley Group and Lime Creek Formation, northern Iowa. IGS Guidebook 28, 96 p.

Hallberg, G.R., 1980, Pleistocene stratigraphy in east-central Iowa: Iowa Geological Survey Technical Information Series 10, 168p.

Hallberg, G.R., 1986, Pre-Wisconsin glacial stratigraphy of the central plains region in Iowa, Nebraska, Kansas, and Missouri: *in* Richmond, G.M. and Fullerton, D.S., eds., Quaternary Glaciations in the United States of America, Report of the International Correlation Programme-Project 24: in Sibrava, V., Bowen, D.Q., and Richmond, G.M., (eds.), Quaternary Science Reviews, Quaternary Glaciations in the Northern Hemisphere, v. 5, p. 11-15.

Hallberg, G.R., Lineback, J.A., Mickelson, D.M., Knox, J.C., Goebel, J.E., Hobbs, H.C., Whitfield, J.W., Ward, R.A., Boellstorf, J.D., and Swinehart, J.B., 1991, Quaternary geologic map of the Des Moines 4° x 6° quadrangle, United States. U.S. Geological Survey, Miscellaneous Investigations Series, Map I-1420, 1:100,000 scale map sheet.

Hershey, H. G., 1969, Geologic map of Iowa, Iowa Geological Survey, scale 1:500,000 (out of print).

Koch, D.L., 1970: Stratigraphy of the Upper Devonian Shell Rock Formation of north-central Iowa. IGS Report of Investigations 10, the state of Iowa, 123 p.

Leverett, F. 1898. The weathered zone (Yarmouth) between the Illinoian and Kansan Till, Journal of Geology v. 6: 238-243.

Leverett, F. 1899. The Illinois glacial lobe: *U.S. Geological Survey Monograph*, 38, 817p.

Lineback, J.A., 1980, The Glasford Formation of western Illinois: Iowa Geological Survey Technical Information Series, no. 11, 181-184.

Norton, W. H., 1899, Geology of Scott County: Iowa Geological Survey, Vol. 9, pp. 389-519.

Prior, J.C., 1976, Landforms of Iowa: Iowa City, University of Iowa Press, 154 p.

Prior, J.C. and Kohrt, C.J., 2006, The Landform Regions of Iowa, Iowa Geological Survey, digital map, available on IDNR GIS Library-ftp://ftp.igsb.uiowa.edu/gis_library/ia_state/geologic/landform/landform_regions.zip; ttp://www.igsb.uiowa.edu/nrgislibx/

Pope, J.P. and Anderson, R. A., 2009, Revision of stratigraphic nomenclature and reclassification of the Morrowan, Atokan, Desmoinesian, Missourian, and Virgilian stages in Iowa, Geological Society of America Abstracts with Programs, v. 41, No. 2, p. 33.Prior, J.C. and Korht, C.J., 2006, The Landform Regions of Iowa, Iowa Geological Survey, digital map, available on IDNR GIS Library- ftp://ftp.igsb.uiowa.edu/gis_library/ia_state/geologic/landform/landform_regions.zip; http://www.igsb.uiowa.edu/nrgislibx/

Quade, D.J., Bettis, E.A. III, and Giglierano, J.D., 2004, Surficial geologic materials of the McCausland Quadrangle, Iowa Geological Survey Open File Map 04-5, 1:24,000 scale map sheet.

Quade, D.J., Tassier-Surine, S.A., McKay, R.M., Giglierano, J.D., and Bettis, E.A., III, 2005, Surficial geologic materials of the Eldridge 7.5" Quadrangle, Scott County, Iowa, Iowa Geological Survey Open File Map 05-5, 1:24,000 scale map sheet.

Quade, D.J., Tassier-Surine, S.A., McKay, R.M., Giglierano, J.D. and Bettis, E.A., III, 2008, Surficial Geology of Cedar County, Iowa Final Phase: Surficial Geologic Map of Cedar County, Iowa, Iowa Geological and Water Survey Open File Map 08-8, 1:100,000 scale map sheet.

Ruhe, R.V., 1969, Quaternary Landscapes in Iowa: Ames, Iowa State University Press, 255p.

Tassier-Surine, S.A., Quade, D.J., Liu, P., Giglierano, J.D., and Bettis, E.A., III, 2005, Surficial geologic materials of the Dixon 7.5" Quadrangle, Scott County, Iowa, Iowa Geological Survey Open File Map 05-4, 1:24,000 scale map sheet.

Tassier-Surine, S., Quade, Deborah, Bettis, E.A., III, McKay, R., Liu, H. and Giglierano, J., 2009a, Surficial Geology of the Davenport West 7.5' Quadrangle, Scott County, Iowa, Iowa Geological and Water Survey Open File Map 09-6, 1:24,000 scale map sheet.

Tassier-Surine, S., Quade, Deborah, Bettis, E.A., III, McKay, R., Liu, H. and Giglierano, J., 2009b, Surficial Geology of the Davenport East 7.5' Quadrangle, Scott County, Iowa, Iowa Geological and Water Survey Open File Map 09-7, 1:24,000 scale map sheet.

Walters, J.C., 1996, General and Environmental Geology of the Cedar Falls/Waterloo Area, The Iowan Surface, in General and Environmental Geology of Cedar Falls/Waterloo and Surrounding Area, Northeast Iowa: Iowa Geological Survey Guidebook Series No. 22, p. 7-9.

Wickham, J.T., 1979, Pre-Illinoian till stratigraphy in the Quincy, Illinois area; in the 43rd annual Tri-State Geological Field Conference, *Ilinois State Geological Survey Guidebook 14*.

Willman, H.B. and Frye, J.C., 1970, Pleistocene stratigraphy of Illinois: Illinois State Geological Survey Bulletin, 94, 204p.

Witzke, B.J., Anderson, R.R. and Pope, J.P., 2010, Bedrock Geologic Map of Iowa, scale: 1:500,000, Iowa Geological and Water Survey, Open File Digital Map OFM-10-1.

Witzke, B. J., 1994, Silurian Stratigraphy in the Quad Cities Area, Iowa-Illinois, in Paleozoic Stratigraphy of the Quad-Cities Region East-Central Iowa, Northwestern Illinois, Geological Society of Iowa Guidebook 59, p. 3-15.

Witzke, B.J. and Bunker, B.J., 1984: Devonian stratigraphy of north-central Iowa. IGS Open File Report 84-2, p. 107-149.

Witzke, B.J., Bunker, B.J., and Rogers, F.S., 1988: Eifelian through lower Frasnian stratigraphy and deposition in the Iowa area, central midcontinent, U.S.A. in McMillan, N.J., Embry, A.F, and Glass, D.J. (eds.): Devonian of the World, Canadian Soc. Of Petroleum Geologists, Memoir 14, vol. I, p. 221-250.

SURFICIAL GEOLOGY OF SCOTT COUNTY, IOWA

Iowa Geological and Water Survey
Open File Map OFM-11-08
September 2011

prepared by

Stephanie Tassier-Surine[1], Deborah Quade[1], E. Arthur Bettis, III[2], Robert M. McKay[1], Huaibao Liu[1], and James Giglierano[1]

Iowa Geological and Water Survey, Iowa City, Iowa

Iowa Department of Natural Resources, Roger L. Lande, Director
Iowa Geological and Water Survey, Robert D. Libra, State Geologist

Supported in part by the U.S. Geological Survey
Cooperative Agreement Number G10AC00423
National Cooperative Geologic Mapping Program (STATEMAP)

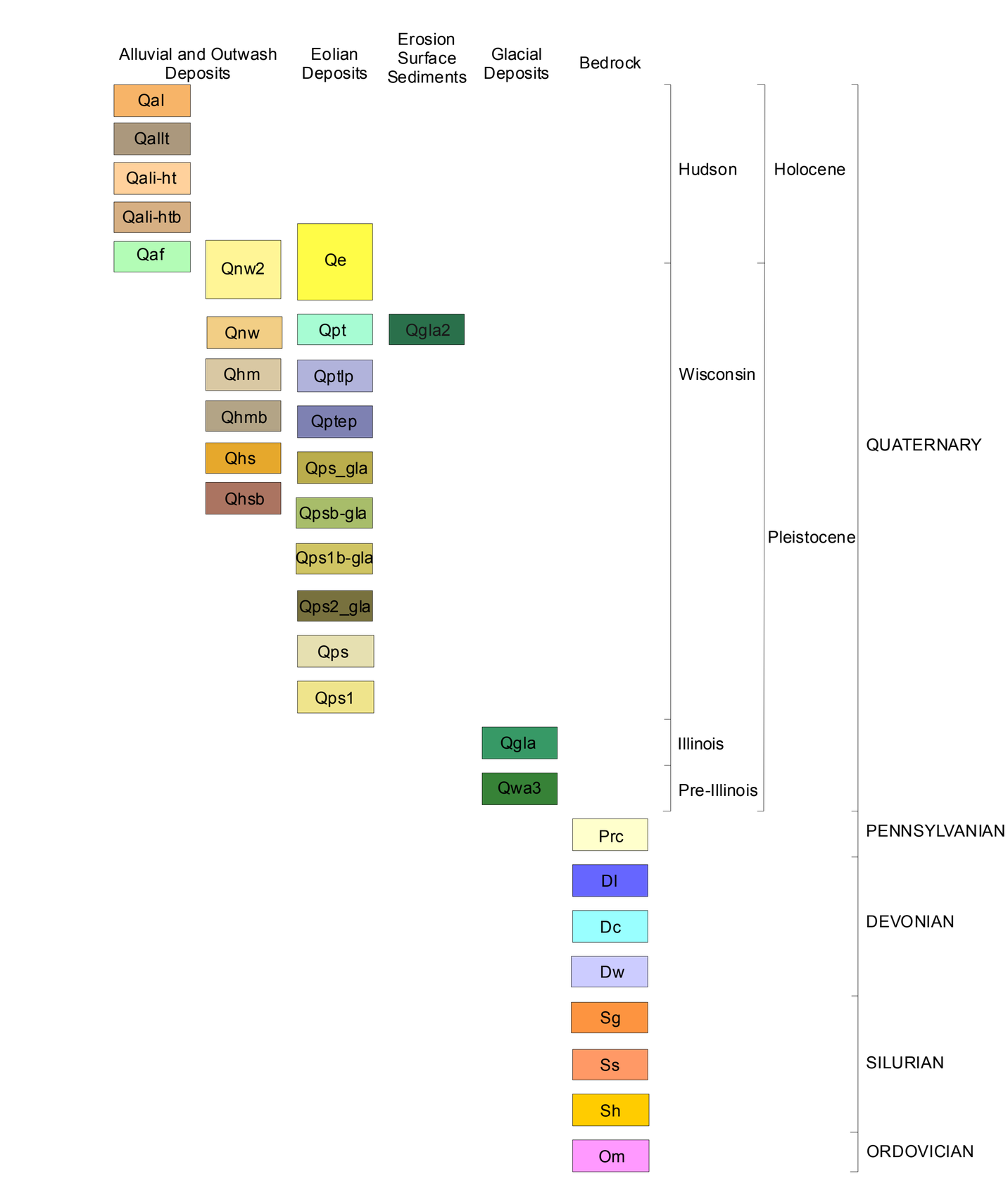
ACKNOWLEDGMENTS

Recognized for contributions to map's production: Andy Asell, Chris Kahle, Ray Anderson, Brian Witzke, Bill Bunker and Mary Pat Heitman. New subsurface geologic data was partly generated by University of Iowa students Sarah Byram and Kyle Bracken who produced descriptive logs of water well drill samples. Jason Vogelgesang and Murray Purdue (IGWS) prepared well samples for stratigraphic logging. Drilling was provided under contract with Aquadrill of Swisher, Iowa, and Cahoy Well & Pump Service, Fredericksburg, Iowa; a special thanks to drilling crew members who worked at times in challenging drilling conditions. Dan Murray, Bob Rowden and Tom Marshall of IGWS provided field assistance during drilling. A special thanks to all landowners who graciously allowed access to their land for drilling: Dean Arp, Bob Dahms, George Goebel, Leonard Hamann, Robert Hamilton, Ellen Kitchen, Don and Karen Krambeck, John Kundell, Kevin Kundell, Steve Marten, Dave Moeller, Dennis and Linda Oberlander, Leroy Paustian, Fred Peeters, Elsie Randolph, William Storjohann, and Kris-Del Farms. Also, thank you to the Iowa Department of Natural Resources for allowing access on public lands for drilling. Thanks to Riverstone Group Inc., Linwood Mining and Minerals Corp., and LaFarge Corporation for access to and information about quarries in the county. Kathy Morris of the Scott County Waste Commission, Basil Nimry of the IDNR Engineering and Realty Services Bureau, Steve Reynolds with the Scott County Secondary Roads Department, and Mitch Tollerud of the Scott County Information Technology Department all provided invaluable boring records from their files. Also, thanks to the Scott County Engineer's Office for providing access to all of their boring logs for this mapping project.

[1]Iowa Geological and Water Survey, Iowa City, Iowa

[2]Department of Geoscience, The University of Iowa, 121 Trowbridge Hall, Iowa City, Iowa 52242

Correlation of Map Units



Base map from Iowa DOT Road Map Layers 2009.

Iowa Geological and Water Survey digital cartographic file ScottCounty_SurficialGeology.mxd, version 9/28/11 (ArcGIS 10.0)
Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 15, datum NAD83.

The map and cross section are based on interpretations of the best available information at the time of mapping. Map interpretations are not a substitute for detailed site specific studies.