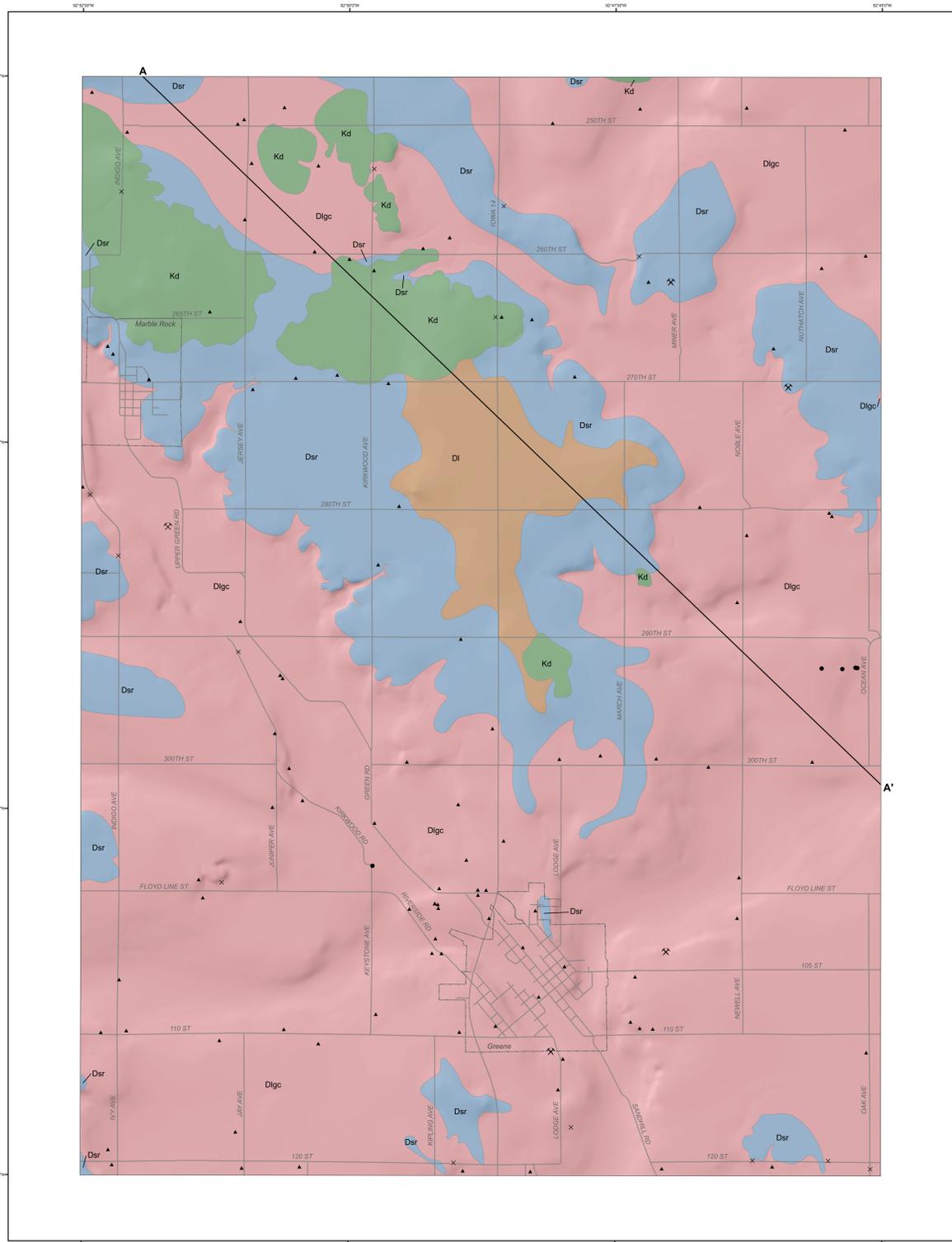


Bedrock Geologic Map of the Greene (Iowa) 7.5' Quadrangle



LEGEND

CEZOZOIC

QUATERNARY SYSTEM

Qu - Unconsolidated Quaternary Sediments (Quaternary System). The Quaternary deposits consist of loess, glacial till, and colluvium of variable thickness, and alluvial clay, silt, sand, and gravel. These deposits cover most of the land surface except in the valleys of the Shell Rock River and Floyd Creek in the mapping area. The thickness of the Quaternary deposits usually varies between 9 and 24 m (30 and 80 ft), with a maximum up to 37 m (120 ft). This unit is shown only on the cross-section, not on the map.

MESOZOIC

CRETACEOUS SYSTEM

Kd - Sandstone, Mudstone, and Shale (Pella Formation) "Mid-Cretaceous". This map unit occurs as scattered residual outcrops and is mostly identified by soil surveys in the northeastern part of the mapping area. The formation consists of massive fossiliferous sandstone and shale facies successions characterized by a variety of lithologies, commonly dominated by quartzite sandstone with secondary chert and concretion, in part composed of iron oxides. The thickness of this unit is variable, but is usually less than 6 m (20 ft) when present in the mapping area.

PALEOZOIC

DEVONIAN SYSTEM

DI - Shale, Limestone, and Dolomite (Lime Creek Formation) Upper Devonian. This map unit occurs on the bedrock surface near the central part of the mapping area. The thickness of this unit is usually less than 9 m (30 ft) when it is present in the quadrangle. This formation consists of calcareous shale in the lower portion and an upper part consisting of limestone, dolomitic limestone, and dolomite. Some layers are fossiliferous and pyritic.

Dsr - Limestone, Dolomite, and Shale (Shell Rock Formation) Upper Devonian. This map unit occurs on the bedrock surface mainly in the northern part of the quadrangle. It usually has a thickness of 9 to 20 m (30-65 ft), but an outcrop of this unit just beyond the northern border of the quadrangle shows a total thickness less than 1 m (3 ft). The formation is characterized by limestone, dolomitic limestone, and dolomite, with minor gray to light green shale and/or argillaceous carbonates. Fossiliferous layers, especially characterized by abundant bryozoa, brachiopods and stromatoporoids, commonly occur in the lower part of the unit.

Dlge - Limestone, Dolomite, and Shale (Lithograph City Formation) Middle Devonian. This map unit forms most part of the bedrock surface of the quadrangle. The thickness of this unit is usually 21 to 30 m (70-100 ft) in the mapping area. It consists of limestone, dolomitic limestone, dolomite, and minor shale. This unit is usually characterized by a variety of lithologies and sub-lithologies (limestone and dolomitic limestone, in part argillaceous, "bitulose" structures, vugs and calcite vug fills are common. Some intervals are fossiliferous and stromatoporoid).

Dcv - Limestone and Dolomite (Coraville Formation) Middle Devonian. This map unit consists of limestone, dolomitic limestone, and dolomite, in part argillaceous to shaly. The thickness of this unit is usually 12 to 22 m (40-70 ft) in the mapping area. Blackshale, chert nodules and concretion occur in the limestone facies. This unit does not occur at the bedrock surface of the map, and is only shown on the cross-section.

Dic - Dolomite, Limestone, and Shale (Little Cedar Formation) Middle Devonian. This map unit is dominated by slightly argillaceous to argillaceous dolomite and dolomitic limestone, usually vuggy and partially laminated and/or cherty. Some minor shale may occur in the upper part of the formation. The thickness of this unit ranges from 27 to 40 m (90-130 ft) in the mapping area. This formation is commonly fossiliferous, and brachiopods are especially abundant in the lower portion. This unit does not occur at the bedrock surface of the map and is only shown on the cross-section.

OTHER FEATURES

- Wells drilled for this mapping project
- Bedrock outcrops
- IGS Geosum data points - records available at www.igsweb.org
- Incorporated city boundary
- Quarries
- Roads
- W29402
- Bedrock Hillshade - shades of gray show the bedrock surface as it would be illuminated by artificial light source from the NW direction

BEDROCK GEOLOGIC MAP OF THE GREENE 7.5' QUADRANGLE, BUTLER AND FLOYD COUNTIES, IOWA

Iowa Geological Survey
Open File Map OFM-17-1
June 2017

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STRATIGRAPHIC COLUMN

System	Series	Stage	Lithostratigraphic Unit	Map Symbol	Lithology	Thickness (in feet)
Cretaceous	"Middle"		Dakota or Windrow formations	Kd	[Symbol]	0-20
			Lime Creek Formation	DI	[Symbol]	0-25
Devonian	Upper	Frasnian	Shell Rock Formation	Dsr	[Symbol]	10-65
			Lithograph City Formation	Dlge	[Symbol]	70-100
			Coraville Formation	Dcv	[Symbol]	40-70
			Little Cedar Formation	Dic	[Symbol]	90-130
Middle	Givetian		Cedar Valley Group			

Introduction to the Bedrock Geologic Map of the Greene 7.5' Quadrangle, Butler and Floyd Counties, Iowa

The Greene 7.5' Quadrangle is located in Floyd and Butler counties, north-central Iowa. This quadrangle lies in the Lower Plains landform region where the land surface had been modified by various episodes of erosion before and during the Wisconsin-age glacial events (Prior, 1991). Due to extensive glacial and erosional activities, the landscape of this area is characterized by relatively low topographic relief and commonly features large fields of glacial till and glacial erratics. The land surface of this mapping area is mostly covered by Quaternary sediments, including loess, glacial sediments, colluvium and alluvial deposits. The thickness of the Quaternary usually varies between 9 and 24 m (30 and 80 ft), with a maximum thickness up to 37 m (120 ft). These unconsolidated Quaternary sediments are undifferentiated in this map. For the detailed Quaternary stratigraphy and distribution, see the surficial geologic map of this quadrangle (Kerr et al., 2017).

Bedrock exposures commonly occur in the valleys along the Shell Rock River and the Floyd Creek in the quadrangle. During the field investigation, shallow bedrock information from the digital soil surveys in Floyd and Butler counties (Voy, 1995; Buckner, 1974) was used for delineating potential bedrock outcrops. In the map area, 18 bedrock outcrops including several rock quarries were accessed and studied, which provided important regional stratigraphic information for the bedrock geologic map. Subsurface geologic information was mainly derived from the analysis of water well data stored in the IGS GeoSum database. Within the quadrangle, 111 private and public wells were studied, including 5 newly drilled holes especially for this mapping project. Among these studied wells, 45 have descriptive stratigraphic logs with cutting samples which are deposited at the Oakdale Rock Library of Iowa Geological Survey (IGS), and 33 of which were newly logged for this bedrock geologic mapping task. Bedrock stratigraphic information from the surrounding area, including bedrock outcrops, quarries, and well information, was also studied and utilized for this mapping project.

The bedrock surface of the Greene 7.5' Quadrangle is dominated by Devonian strata, with scattered Cretaceous deposits. Paleogeographically, the mapping area is within the northern portion of the Devonian Iowa Basin, a region of thickened shelf carbonate, shale and minor others deposited from the Eifelian through part of the Famennian age (Witzke et al., 1988; Witzke and Bunker, 2006; Day, 2006; Day et al., 2008). The Middle and lower Upper Devonian carbonate rocks form the important upper bedrock aquifer in the mapping area (Lira et al., 1984, 1994). This Devonian aquifer becomes vulnerable when it is shallow, and carbonate rocks, especially relatively pure limestones, are easily karstified (Moore, 1995). Due to its complex sedimentary lithology and depositional environments, the geology, paleontontology, paleogeology and stratigraphy of the Devonian Iowa Basin have been intensively studied. Early studies include the publications of Belanski (1927, 1928) and Koch (1970). Recent studies of the Devonian Iowa Basin are represented by Witzke and Bunker (1984), Anderson (1984), Bunker and others (1986), Witzke and others (1988), Bunker (1995), Anderson and Bunker (1998), Groves and others (2008), McKay and Liu (2012), and Day and others (2006, 2008, 2013). Geologic mapping projects at 1:24,000 scale in north-central Iowa have been undertaken by the IGS since 2009. In addition to 7.5' quadrangle maps, 1:100,000 scale bedrock geologic maps have been recently completed for Bremer County (McKay et al., 2010), Worth County (Liu et al., 2012), Black Hawk County (Rowden et al., 2013), Cerro Gordo County (Liu et al., 2015), and Mitchell County (Clark et al., 2016) in the Devonian Iowa Basin. The Bedrock Geologic Map of Iowa (1:500,000) was completed by Witzke and others (2010). Results from these geologic studies and bedrock geologic mapping projects provide significant regional geologic information and new data for the present bedrock map.

Four bedrock formations, in descending order, the Cretaceous Dakota or Windrow Formation, the Devonian Lime Creek, Shell Rock, and Lithograph City formations comprise the bedrock surface of the map area, and the majority of which is occupied by the Lithograph City Formation. Two other formations, the Devonian Coraville and Little Cedar formations, are found in wells only and do not occur at the bedrock surface. The bedrock stratigraphic nomenclature and correlation of the Devonian strata for this map follow the stratigraphic framework proposed by Witzke and others (1988). The general lithologic features and thickness of each map unit are shown in the Stratigraphic Column and described in the Legend section of this map.

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Adjacent 7.5' Quadrangles

ROCKFORD	ROSEVILLE	CHARLES CITY
AURELIA	GREENE	NASHIAN WY
DUMONT NORTH	ALISON	CLARKSVILLE



GEOLOGIC CROSS-SECTION A-A'

