

# SURFICIAL GEOLOGIC MAP OF THE MUSCATINE NW 7.5' QUADRANGLE, MUSCATINE COUNTY, IOWA

Phil Kerr, Stephanie Tassier-Surine, and Alyssa Bancroft  
Iowa Geological Survey, IHR-Hydroscience & Engineering, University of Iowa, Iowa City, Iowa

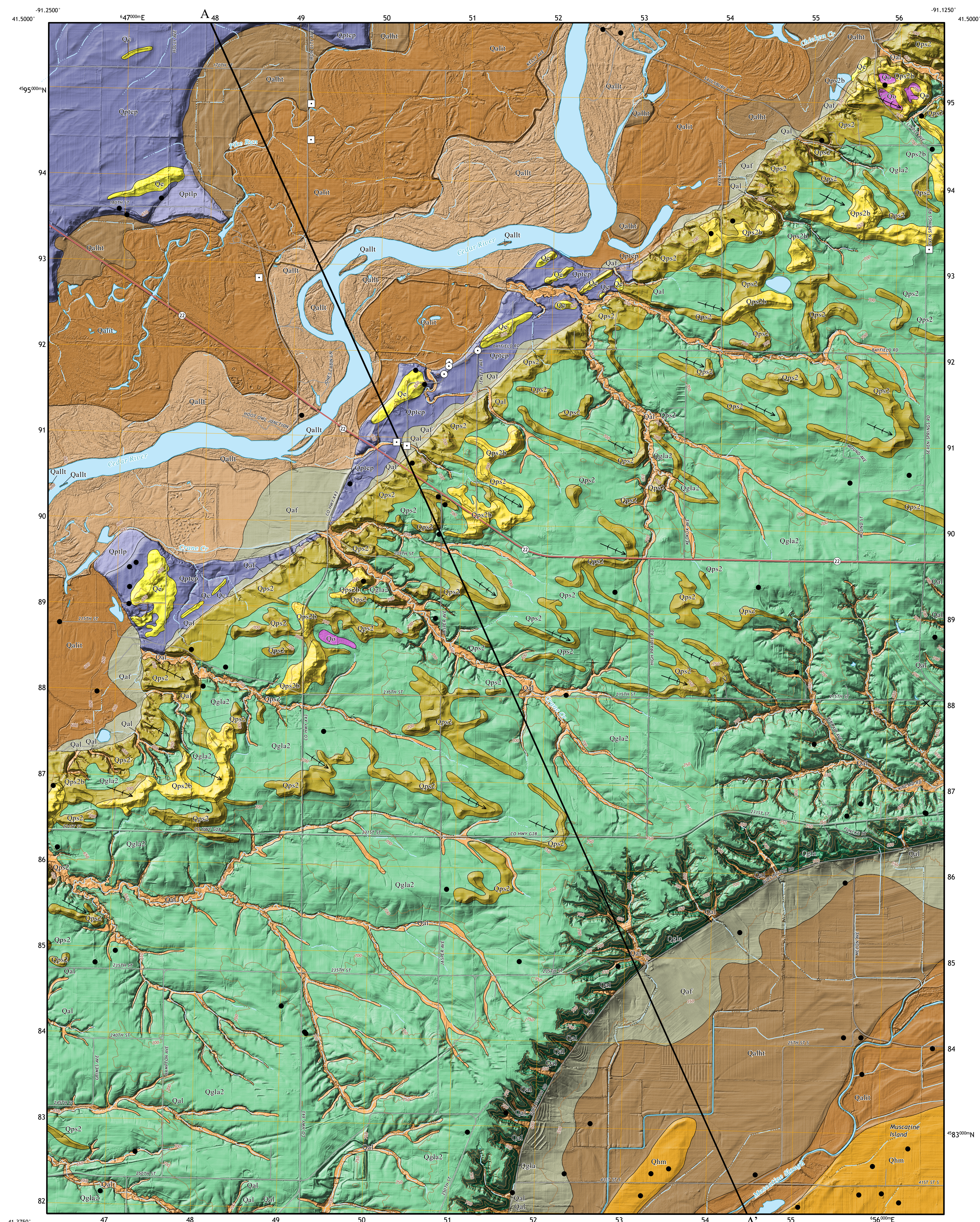
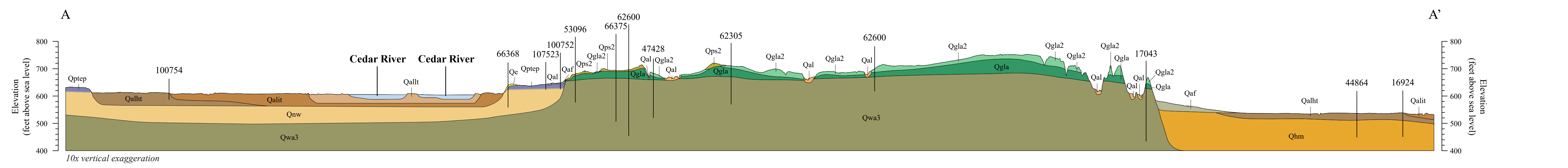


Figure 1. The location of the Muscatine NW Quadrangle in Iowa.



## INTRODUCTION

The Muscatine NW 7.5' Quadrangle is located in Muscatine County, Iowa. Unlike other areas in eastern Iowa, the mapping area does not have bedrock outcrops. There is no bedrock outcrop in the mapping area, in fact the bedrock surface may be 110 m (360 ft) below the modern surface across large portions of the landscape. This is due to the combination of the presence of the Cleona Bedrock Channel and glacial deposits from multiple Quaternary ice advances. The landscape of the mapping area is divided between the Cedar River Valley, the Illinoian till plain, and the Mississippi River Valley. The interplay between these three surfaces and the bedrock channel have been a source of interest and scientific debate since the 19<sup>th</sup> century.

The Cedar River Valley in the mapping area is considerably wider than the bedrock confined valley upstream. Sediments in the valley are largely comprised of coarse glaciofluvial deposits of the Noah Creek Formation that can be 15 to 25 m (50 – 80 ft) thick underlying 3 to 8 m (10 – 25 ft) of fine-grained Holocene alluvium or in place or reworked Peoria Formation silt. These sediments are above tills and outwash of the pre-Illinoian Wolf Creek and Alburnett formations.

The mapping area includes the presumed terminus of the Illinoian advance, however an obvious moraine is lacking. The uppermost till of the uplands is the Glasford Formation and is generally beneath sand and loess of the Late Wisconsin. Paleowind indicators, especially dune forms, show sediments of the Peoria Formation were carried by wind from the northwest. A sand ramp is present along the southeast side of the Cedar River Valley which allowed sand to saltate out of the river valley. Upland dunes can be over 15 m (50 ft) high and are found close to the Cedar River Valley. Loess, on the other hand, thickens towards the Mississippi River Valley. Notably, the till plain generally lacks the Sangamon Geosol, which suggests a period of erosion during the Late Wisconsin Episode.

The Mississippi River Valley comprises the southeastern portion of the mapping area. The western valley appears to be formed from one scarp which was likely formed by a diversion event during the Late Wisconsin. The valley contains stratified sands and gravels of the Henry Formation. These materials were deposited during the Late Wisconsin when the Mississippi River received meltwater from multiple ice lobes. Near the valley wall, the Henry Formation is covered by Holocene-aged alluvial fans of the Corrington Member, which is part of the DeForest Formation.

Ultimately, the mapping area is a complex, polygenetic landscape that has been developing through multiple glacial cycles. The relationships between these materials and geomorphologic processes will continue to be investigated in future mapping projects.

Data collected for this mapping project included 11 drill cores, 8 hand probe locations, and three exposures.

## DESCRIPTION OF MAP UNITS

### 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 Formation till or Noah Creek Formation sand and gravel. Associated with low-relief modern floodplain, closed depressions, modern drainageways, or toeslope positions on the landscape. Unit also includes colluvial deposits derived from adjacent map units. Seasonal high water table and potential for frequent flooding.
- Qaf** - **Alluvial Fan** (Corrington Mbr) Variable thickness of 2 to 5 m (7-16 ft) of dark brown to yellowish brown, noncalcareous, silty loam to loam with interbedded lenses of fine sand and silts. A pebble lag is commonly found at and near the fan surface. Within the Cedar River Valley, alluvial fans overlie older silty clay to sandy loam alluvium of Holocene terraces or thick sand and gravel of the Noah Creek Formation and sand and gravel of the Henry Formation within the Mississippi River Valley.
- Qallt** - **River Channel Belt – Low Terrace** (DeForest Formation-Camp Creek and Roberts Creek members) 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 Cedar River. May overlie Wolf Creek/Alburnett formations or Noah Creek Formation sand and gravel. Occupies lowest position on the floodplain (i.e., modern and historic channel belts). Qe-low lakes and meander scars are common features associated with this terrace level. Mapped primarily using aerial imagery and LiDAR. Seasonal high water table and frequent flooding potential.
- Qalit** - **Intermediate Terrace** (DeForest Formation-Camp Creek, Roberts Creek, and Gunder members) Variable thickness of less than 1 to 5 m (2-16 ft) of very dark gray to brown, noncalcareous, stratified silty clay loam to loam that overlies the Noah Creek Formation or Henry Formation. Occupies low terrace position above the modern floodplain in the Cedar River and Mississippi River valleys. Seasonal high water table and frequent flooding potential.
- Qalht** - **High Terrace** (DeForest Formation-Gunder and Corrington members) Variable thickness of less than 1 to 7 m (3-22.5 ft) of very dark gray to brown, noncalcareous, silty clay loam, loam alluvium or colluvium. Overlies Noah Creek Formation or Henry Formation. Occupies terrace and flood margin position 2 to 3 m (7-10 ft) above the modern floodplain in the Cedar River and Mississippi River valleys. Seasonal high water table and rare flooding potential.
- Qo** - **Depressions** (DeForest Formation-Woden Member) Generally 2.5 to 6 m (8-20 ft) of black to very dark gray, calcareous, muck, peat and silty clay loam colluvium and organic sediments in drained and undrained, closed and semi-closed depressions. Overlies gray, calcareous, loam diamiction of the Glasford Formation or eolian sand of the Peoria Formation. Associated with parabolic dunes. Supports wetland vegetation and can be permanently covered by water.

#### WISCONSIN EPISODE

- Qe** - **Sand Dunes and Sand Sheets** (Peoria Formation-sand facies) Generally less than 3 m (10 ft) of yellowish brown, massive, loamy sand to fine sand. It may overlie yellowish brown coarse-grained sand and gravel of the Noah Creek Formation or it may overlie yellowish to grayish brown, usually calcareous, stratified loam to silt loam to sandy loam diamiction of the Glasford or Wolf Creek/Alburnett formations. Usually restricted to narrow belts within the Cedar River Valley.
- Qnw** - **Sand and Gravel** (Noah Creek Formation) Generally 3 m (10 ft) to more than 20 m (66 ft) of yellowish brown to gray, poorly to well-sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand and gravel. This unit is found in the Cedar River Valley and underlies Holocene alluvium and other terrace deposits. Shown only on the cross-section.
- Qhm** - **Sand and Gravel** (Henry Formation-Muscataine Member) Generally 3 m (10 ft) to more than 20 m (200 ft) of yellowish brown to gray, poorly to well-sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand and gravel. This unit is found in the Mississippi River Valley and underlies Holocene alluvium and other terrace deposits.
- Qps2** - **Eolian Sand and Intercalated Silt** (Peoria Formation-sand facies) Generally 5 to 10 m (16-32 ft) 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 eroded, massive, fractured, loamy glacial till of the Glasford or Wolf Creek/Alburnett formations or periglacial sediments along smaller drainages.
- Qps2b** - **Eolian Sand and Intercalated Silt** (Peoria Formation-sand facies) Over 10 m (> 33 ft) 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 eroded, massive, fractured, loamy glacial till of the Glasford Formation.
- Qptlp** - **Late Phase High Terrace (LPHIT)** (Peoria Formation-silt and/or sand facies) Generally 2 to 8 m (7-26 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 of the Noah Creek Formation.
- Qptep** - **Early Phase High Terrace (EPHT)** (Peoria Formation-silt and/or sand facies) Generally 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 Farndale 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 mapped in Illinois.

#### ILLINOIAN EPISODE

- Qgla2** - **Periglacial and Eolian Sediments Shallow to Glacial Till** (unnamed erosion surface sediment) Generally 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.
- 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 Farndale/Sangamon Geosol. This unit overlies Pre-Illinoian diamiction of the Wolf Creek/Alburnett formations and outcrops along the Mississippi River Valley.

#### PRE-ILLINOIAN EPISODE

- Qwa3** - **Till** (Wolf Creek or Alburnett formations) Generally 15 to 60 m (50-200 ft) of very dense, massive, fractured, loamy glacial till of the Wolf Creek or Alburnett formations. This unit overlies Paleozoic bedrock and is only shown on the cross-section.

## CORRELATION OF MAP UNITS

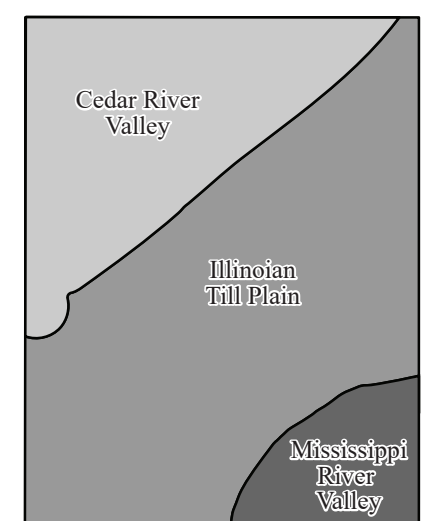
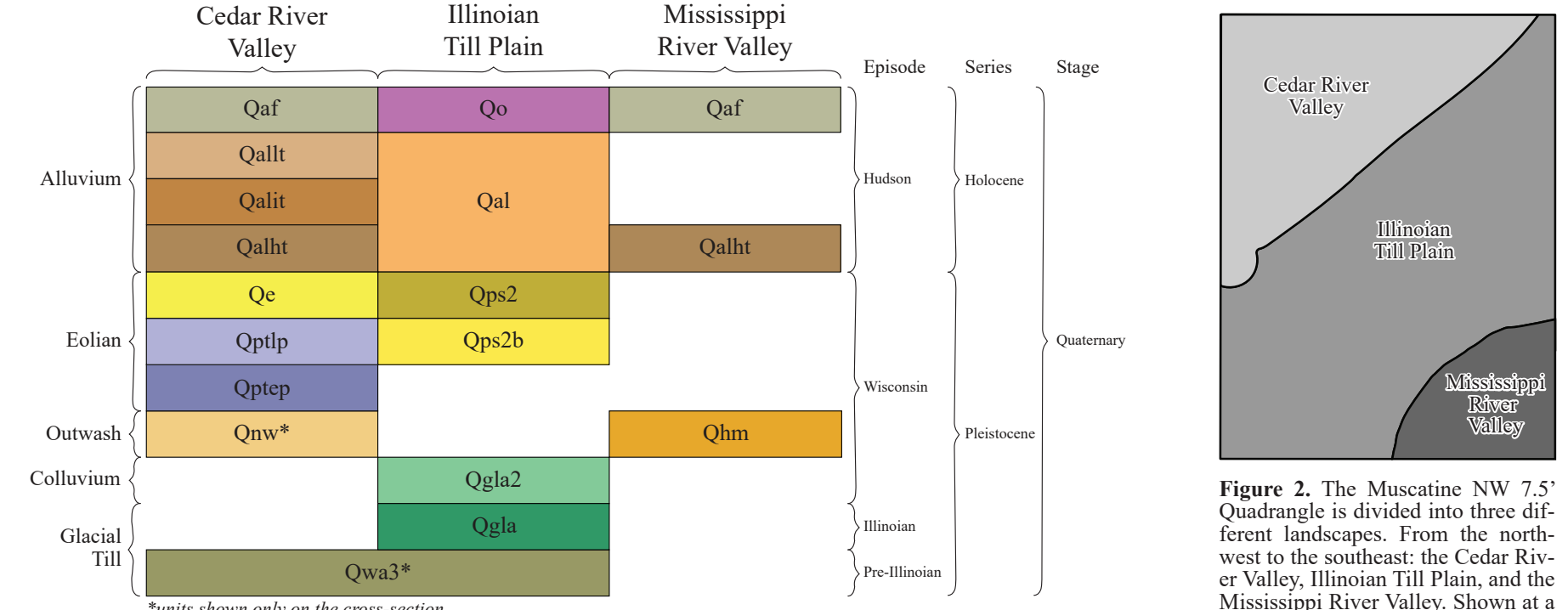


Figure 2. The Muscatine NW 7.5' Quadrangle is divided into three different landscapes. From the northwest to the southeast: the Cedar River Valley, Illinoian Till Plain, and the Mississippi River Valley. Shown at a 1:200,000 scale.

## ACKNOWLEDGEMENTS

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## GEOLOGIC CROSS-SECTION A-A'

