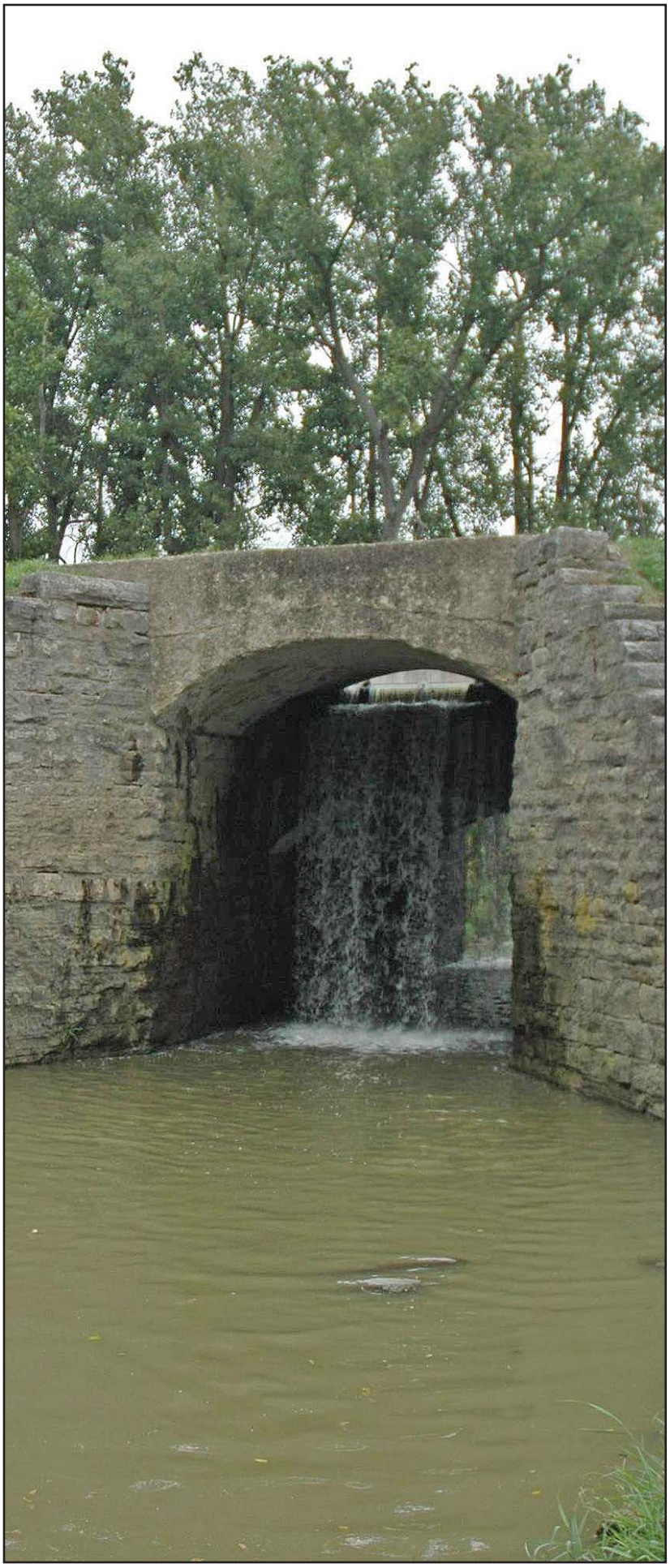


THE GEOLOGY OF THE ST. MARYS REGION

STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY

www.OhioGeology.com

GEOLOGY OF THE ST. MARYS REGION

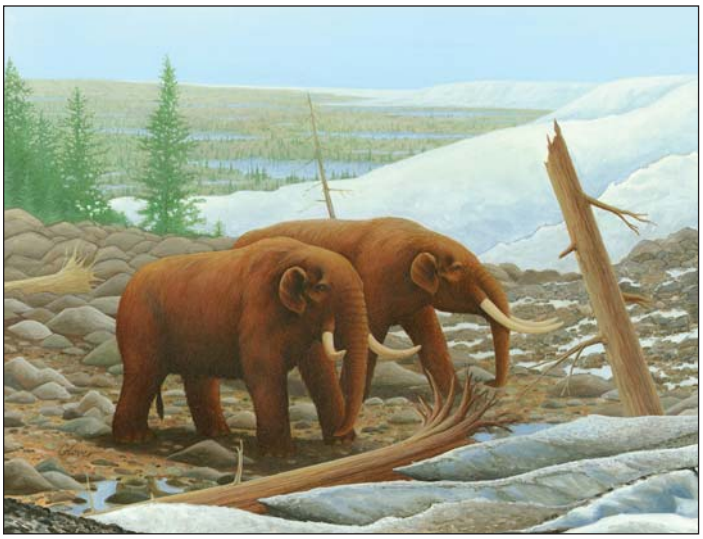
by Mark E. Wolfe
Cover photo: View of the Six-Mile Creek aqueduct on the Miami & Erie Canal, Auglaize County.

The land surrounding St. Marys was shaped by eons of geologic processes. And development of the city of St. Marys and the surrounding region was based and continues to rely upon knowledge of the geology. Construction of prominent geographic features, such as the Miami & Erie Canal and Grand Lake St. Marys, were dependent on the topography and natural resources, which continue to shape the land today. The Miami & Erie Canal corridor contributes to the local economy by providing a valuable linear park and the recreational appeal of Grand Lake St. Marys cannot be underestimated. Valuable crops are grown on glacially-derived soils and important industrial minerals are obtained from the underlying bedrock. Oil-and-gas production helped shape the area and may be exploited in the future with the development of new technology. Important geologic specimens such as fossils, minerals, and meteorites continue to be discovered.

Ice Age and the Teays River

The relatively flat terrain and fertile farmlands near St. Marys are a result of the most recent significant geologic event in North America: the Ice Age. More than 100,000 years ago, global temperatures declined as much as 15°F, which caused the formation of huge glaciers in Canada. The continental-size glaciers advanced into Ohio, reaching as far as the Ohio River in southwest Ohio. Glacial encroachment into Ohio was not steady but occurred in a series of advances and retreats over thousands of years. The glacier scoured out bedrock and entrained it into the ice mass, carrying it forward until it was deposited at the glacier's melting southern edge. This is the reason igneous and metamorphic rocks from Canada, called *erratics*, often can be found in fields or along streams in the area. Additional evidence of the Ice Age:

- A series of low ridges trending east–west in Ohio and Indiana indicate that ice advanced, then stalled and deposited clay, sand, and gravel in a feature called a *moraine*. The moraine north of St. Marys is called the **Wabash Moraine** and affected stream drainage. Grand Lake St. Marys was constructed at its present location partly due to the fact that the Wabash Moraine blocked stream outflows to the north.
- The ice blocked ancestral streams and formed lakes in which fine-grained sediments were deposited. These former lakes became wetlands that needed to be drained by early settlers so that the rich soils could be worked.
- Geologic mapping has delineated a buried, 400-ft-deep valley that is located east of Grand Lake St. Marys, continues beneath the lake, and exits to the northwest. This valley was the site of a large, ancient river named the **Teays River**, which existed prior to glaciation. The Teays originated in Virginia, flowing northward through Portsmouth and Columbus, then northwestward into Indiana. Prior to the Ice Age, the St. Marys topography would have resembled the Ohio River valley; glaciation completely buried any surface evidence of this mighty river in the St. Marys area.
- Fossil remains of extinct animals have been discovered in Auglaize County. There are four documented **American Mastodon** discoveries in the county. The mastodon resembled a modern Asian elephant but was more heavily muscled and had a different type of teeth. Another Ice Age mammal recovered from Auglaize County was the Giant Beaver, which was three times the size of modern beavers.



Artist's depiction of mastodons along a glacial border.

Bedrock Geology

Sedimentary rocks underlie the glacial deposits. This bedrock geology consists of dolomites that are more than 400 million years old. A **dolomite** is similar to a limestone (calcium carbonate), except that the calcium has been partially replaced with magnesium in a process known as *dolomitization*. There is evidence that the dolomite was originally associated with a **reef** deposit in a shallow-marine environment. The fossils normally associated with reef environments have been mostly destroyed by dolomitization, but other reef attributes can be found. Dolomite has many uses:

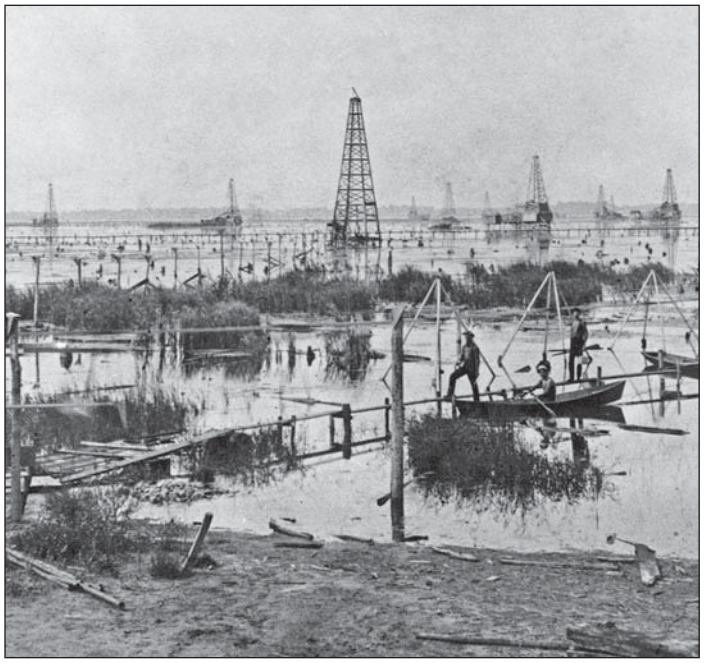
- As an **aggregate** (less than two inches in size) for highway or building construction throughout Auglaize County or as **rip-rap** (greater than six inches) to protect dams, lakeshores, or other water retention structures. An **asphalt** mix contains more than 90 percent aggregate, while **concrete** consists of approximately 85 percent aggregate. Concrete was used to upgrade Miami & Erie Canal locks from the original wood beginning in the early 1900s. An example is Lock 14N, which was originally reconstructed using concrete in 1905.

- As **agricultural lime** to help control the acidity/alkalinity or pH of farm fields. Proper pH is critical to plant health and helps limit the amount of pesticides and fertilizers that must be applied.
- As building stone in 1852 to reconstruct the original wood **Bulkhead Lock** at the Grand Lake St. Marys outlet to the feeder canal. The impressive stone structure was constructed with large blocks of cut stone and fitted together with a maximum gap of 0.25 inches. **Lock 8N** was reconstructed with stone in 1860 and remains one of the best-preserved original stone locks on the Miami & Erie Canal. Building stone can also be seen at "The Tumbles," St. Marys aqueduct, and Six-Mile Creek aqueduct.

Petroleum Geology

During the late 1800s, Ohio pioneered oil-and-gas production in the United States, with the first oil production in the state occurring only a year after the famous Titusville, Pennsylvania, discovery. The giant **Lima-Indiana** oil field was discovered during the 1880s and had a profound impact on the industrial development of Ohio. John D. Rockefeller began amassing his fortune by controlling production and refining of the oil produced in northwestern Ohio. Other highlights of the petroleum industry of northwestern Ohio:

- Northwestern Ohio was the leading oil-producing region in the world from the 1880s until the discovery of the Texas oilfields in 1901.
- In 1891, the first oil wells were drilled in Grand Lake St. Marys. Wood pilings were driven into the lake bottom and the standard drilling rig was constructed on top. This may constitute the **first over-water drilling** in the United States.



View of offshore oil wells from the south shore of Grand Lake St. Marys, *circa* 1915.

Additional Noteworthy Geologic Occurrences

- **Minerals**—Nice specimens of calcite (calcium carbonate), pyrite (iron sulfide), quartz (silicon dioxide), and sphalerite (zinc, iron sulfide) can be found in the county, particularly at the quarry at Buckland.
- **Meteorite**—The 13-lb Kossuth iron meteorite was discovered in 1975. Meteorites are very rarely found and can be mistaken for ironstone or pyrite concretions, unusual glacial erratics, or industrial by-products such as slag, cinders, or pig iron from old iron furnaces. Most meteorites are magnetic and very heavy.
- The engineers working on the Miami & Erie Canal were concerned with **soil types**, particularly if the soil contained sufficient clay to reduce or eliminate water loss. The Blount-Pewamo soils found near St. Marys are classified as somewhat to very poorly drained soils.

The Kossuth meterorite found in 1975 near the village of Kossuth, Auglaize County.

Further Reading

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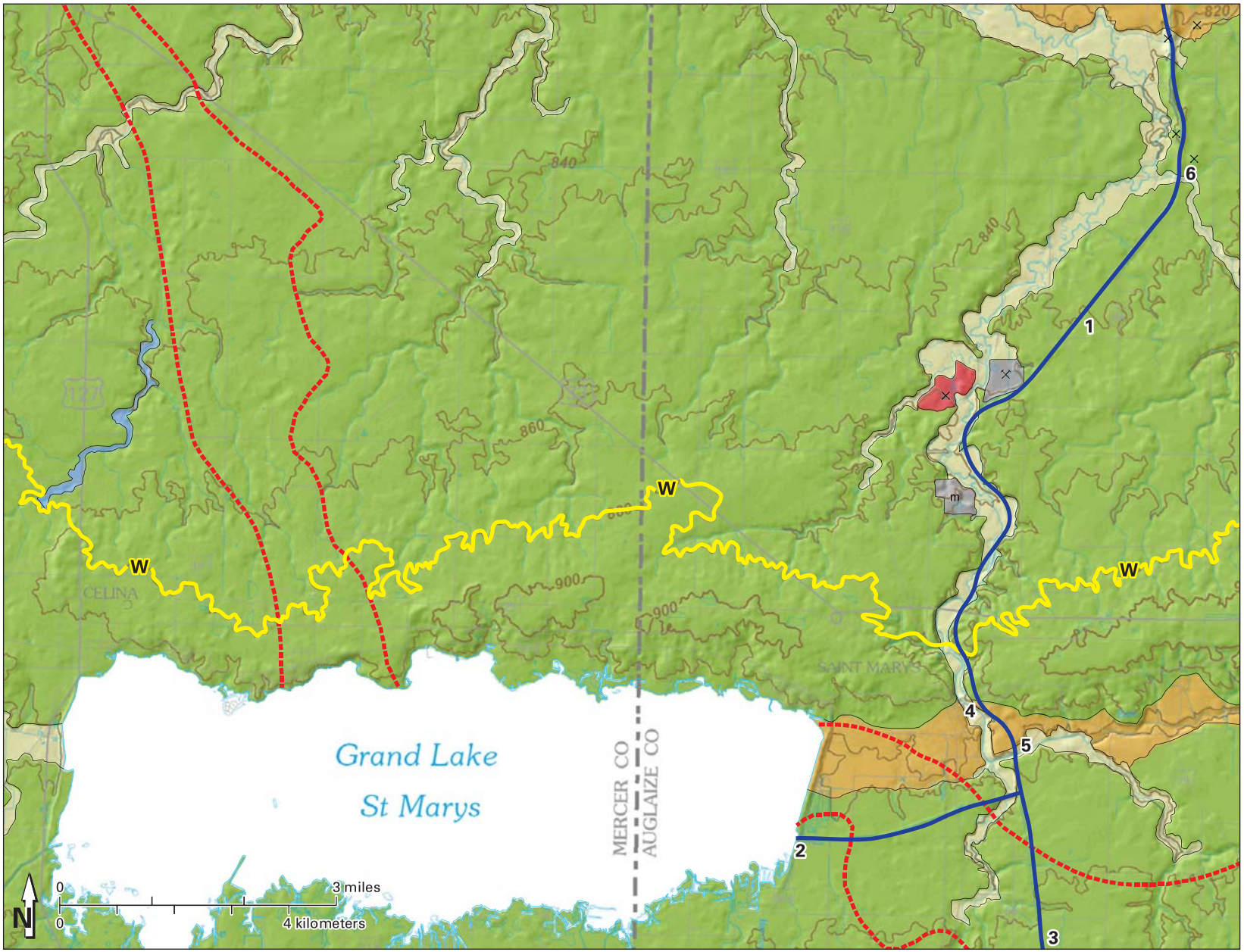

Modified from Jones and others, 2011

Map showing surficial geology and points of geologic interst in the St. Marys region. The approximate course of the ancient Teays River is highlighted.

- Boundary between map-units areas
- Miami & Erie Canal
- Teays River buried valley boundary, 200–400 ft deep
- W Wabash Moraine

- m Made land, larger pits, quarries, or mines
- Alluvium
- Ice-contact deposits
- Silt
- Sand and gravel
- Unsorted mix of silt, clay, gravel, and boulders
- Quarry, mine, or strip mine
- Sand-and-gravel pit

1 Lock 14N
2 Bulkhead Lock
3 Lock 8N
4 "The Tumbles"
5 St. Marys aqueduct
6 Six-Mile Creek aqueduct