

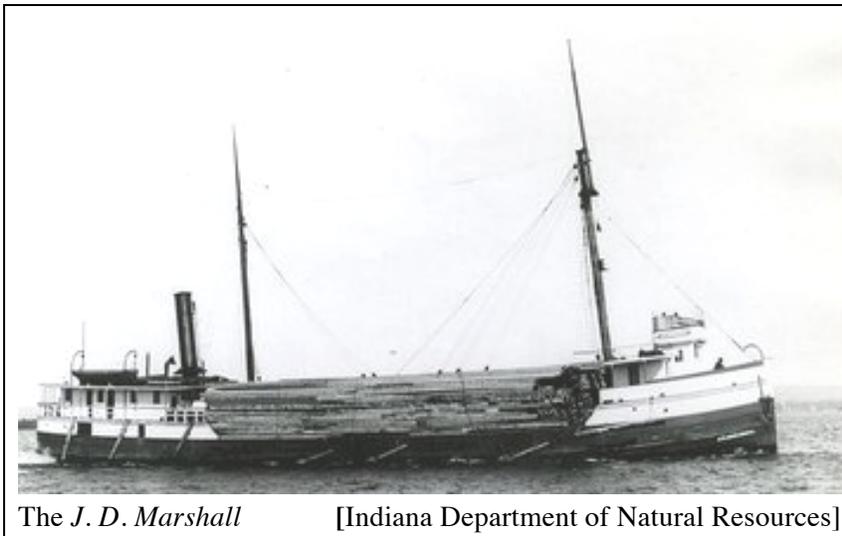
Appendix A

Sandsuckers Sunk

Two ill-fated sandsuckers have sunk off the coast of the Duneland area.

The *Muskegon* was built in 1872 as a combination passenger and package freight vessel called the *Peerless*. In 1908 it was sold to the Buck and Mullen Steamship Company and renamed the *Muskegon*. It was said to have used its private rooms as an offshore gambling house and possibly a bordello. It was later refitted as a sand-sucker.¹

In any case, in 1910 the *Muskegon* burned at Michigan City's harbor and sank. The next year it was re-floated, some of its sand-sucking machinery was salvaged after which the ship was scuttled about two miles west of the harbor. The *Muskegon*, believed to be the oldest vessel in Indiana's waters, is listed on the Indiana Register of Historic Sites and Structures.



The *J. D. Marshall* was built in 1891 to transport lumber. But as the lumber business was dying down it was purchased in 1911 by the Sand and Gravel Company with funds from an insurance settlement when the *Muskegon* burned, and converted into a sand sucker. The new owners then outfitted it with some of the equipment salvaged from the *Muskegon*.²

The *J. D. Marshall* set out on June 10, 1911, to a spot immediately north of today's Dunes State Park and collected about 400 cubic yards of sand. Unfortunately, it then sprang a leak late that afternoon. A storm that evening caused the sand in the hull to shift and the vessel rolled over. Four lives were lost.

The shipwreck was found in 1979 and believed then to be the most intact of all Indiana shipwrecks in Lake Michigan. Unfortunately, there was an illegal salvage of the vessel in 1882 at which time the ship was partially raised, the propeller removed, then accidentally dropped causing considerable damage when it hit the lake bottom.³ The artifacts that had been removed were confiscated; many of them are on display in the park's nature center. The *J. D. Marshall*'s propeller now sits just outside the Dunes State Park pavilion.

On September 30, 2013, the *J.D. Marshall* became Indiana's first underwater preserve. As such it is given the highest amount of protection a tract of land or now water can have within Indiana. The intent is simply to keep the *J D Marshall* in an undisturbed condition.⁴

¹ Kaufmann, 2013, p. 85.

² Kaufmann, 2013, p. 79.

³ Kaufmann, 2013, p. 80

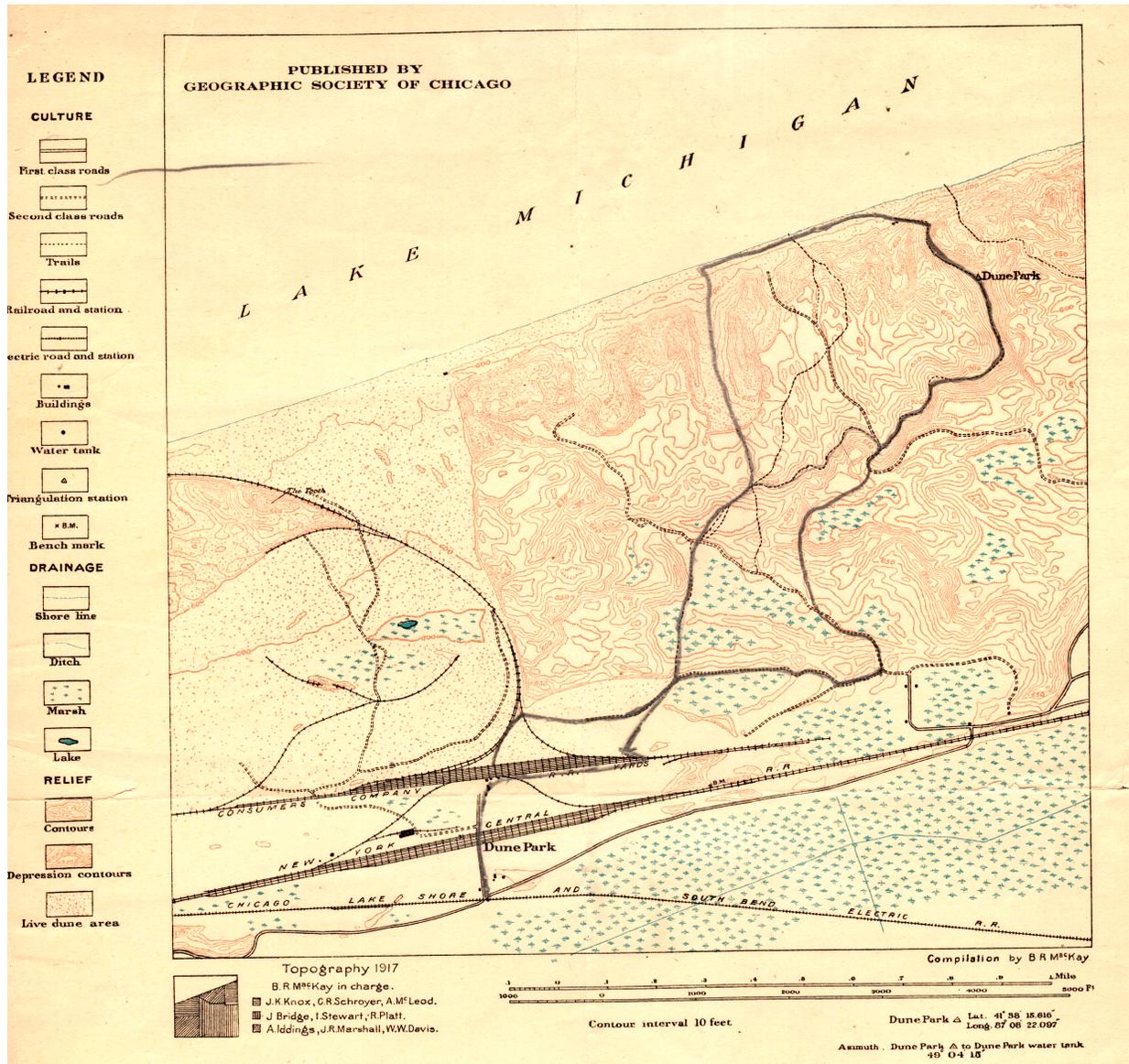
⁴ Indiana Department of Natural Resources. http://www.in.gov/dnr/parklake/files/sp-JDM_FAQ.PDF

Appendix B

1917 Topographic Map of Dune Park

The Dune Park map reproduced here is the oldest topographic map found of any location in Porter County. It clearly shows the dunes and wetlands as well as the trails, roads, and rail lines built in order to mine the area. Unlike the other topographic maps in this report, this map was not produced by the United States Geological Survey, but privately by the Geographic Society of Chicago. The map was so revolutionary that it included a definition of contour lines.

This map was part of the John Bergendahl folio donated by him to the Westchester Township Historical Society.



[Westchester Township History Museum.]

Appendix C

The Indiana Natural Gas Boom and its Effects on Sand Mining in the Dunes

The glass industry in Indiana expanded in the latter part of the nineteenth century when natural gas was found to be plentiful (and cheap) within bedrock located in east-central Indiana. Glass is made from silica, the major component of sand, but the cost of heating the sand to its melting point was prohibitive until this gas field was found.

The Trenton gas field was discovered in 1876 near the town of Muncie but not until 1884 recognized for what it was—*the largest natural gas field yet known in the world*. Soon every town in that part of the state had gas wells and natural gas was being shipped by pipeline to cities as far away as Chicago.

The availability of cheap natural gas attracted many industries to the state.⁵ The Muncie, Anderson, Alexandria, Elwood, Marion, and Kokomo areas of the state all took advantage of the availability of cheap natural gas and began offering incentives for companies to move there. Even tiny Harrisburg, Indiana, which changed its name to Gas City, induced 35 industries to move to town.⁶ In 1887 the city of Kokomo convinced the Diamond Plate Glass Company of Pittsburgh to move to town and build a thirteen-acre factory, one of the largest in the state.⁷ Diamond later opened a second plant in

Elwood. In 1888, the Opalescent Glass Company was established, also in Kokomo.⁸



The famous Ball logo that has been embossed on millions of glass jars.
[Glassbottlemarks.com]

But of all the companies to move to East-Central Indiana to take advantage of this cheap gas, probably the best known was the Ball Brothers Manufacturing Company, which relocated from Buffalo, New York, to Muncie, in 1888.⁹ Ball was undoubtedly the best-known canning jar manufacturer in the world, but it also made a large number of other glass jars for the packaging industry during its long history—many with the name Ball on the bottom.¹⁰

Arriving the same year, and building across the street from the Ball Company, was the Hemingray Glass Company, best known for its glass insulators needed then on telegraph poles, but soon to be used for telephone poles as well.¹¹

⁵ Glass, 2000a, p. 313.

⁶ Glass, 2000b, p. 22.

⁷ Glass, 2000b, p. 22.

⁸ Indiana Historical Society. <http://www.indianahistory.org/our-services/books-publications/hbr/kokomo-glass.pdf>.

⁹ David Whitten. <http://www.glassbottlemarks.com/ball-bros-glass-company>.

¹⁰ Ibid.

¹¹ Ohio History Connection. http://www.ohiohistorycentral.org/w/Hemingray_Glass_Company?rec=3329.

By 1900 Indiana ranked second among glass making states in the country.¹² By 1905 there were 71 glassworks working in Indiana and together, these produced about one-third of the entire production in the United States.¹³

Requirements for Making Glass

Quartz (silica or silicon dioxide, SiO₂) is the major raw material used in the manufacture of glass, making up from 52 to 65 percent by weight of the ingredients.¹⁴ Sands used for glass must be uniformly sized without any coarse or fine particles. Coarse grains require too high a temperature and too much time in order to melt. Fine sand is too easily blown away by air currents in the furnaces.¹⁵

To make glass one needs sand, limestone, and fuel. Indiana had all three in abundance in the 1890s. However much of the sand at first used in the manufacture of Indiana glass came from the mining and crushing of sandstone, not sand dunes. In fact dune sand isn't even mentioned in a USGS 1907 report on the glass-sand industry of Indiana.¹⁶ However, in 1922, the Indiana Department of Conservation promoted northwest Indiana noting that one of the largest areas of sand suitable for making glass was in the dune region of Lake, Porter, and LaPorte counties. It added, "the area contains an inexhaustible supply of glass sand."¹⁷

Dune Sand in Glass Making

As early as 1883, just before the realization that the Trenton gas field was a valuable source of energy, a glass factory was built in the Michigan City area. It succeeded in making some glass, but the efforts to do so commercially failed and the factory closed the next year.¹⁸

The percentage of silica in the sand determines the type of glass that can be made. Optical glass requires a very high silica content. Amber glass can be made with a lower silica content.¹⁹

An analysis of the glass sands of Indiana by the Indiana Department of Geology and Natural Resources (1914), shows that the sand from Michigan City was unique among 13 other sand sources analyzed from around the state. It shows that the silica content was least of those analyzed at 91.98%. The sand was third highest in alumina at 4.44%; very low in ferric oxide (iron) at .56%; highest of all in calcium oxide (lime) at 2.20%, and with only a trace of magnesium oxide (a glass clarifier).²⁰

The Hoosier Slide

¹² Glass, 2000b, p. 22.

¹³ Burchard, 1907, pp 361-376.

¹⁴ Bates, p. 101.

¹⁵ Murray, 1952, p. 2.

¹⁶ Burchard, 1907, pp 361-376.

¹⁷ Burford, 1922, p. 1049.

¹⁸ Daniels, 1904, p. 183.

¹⁹ Murray, 1952, p. 2.

²⁰ Barrett, 1914.

Although mining of the Hoosier Slide in Michigan City had begun in the 1890s, it wasn't used in Indiana's glass industries until 1912.²¹ Probably, one drawback to using Hoosier Slide sand for glass was that the specific chemical makeup of the sand gave glass made from it a bluish color.²² The Hemingray Glass Company, in Muncie, made glass insulators and particularly liked colored glass. Over the years, they made insulators in many different colors. Hoosier Slide sand was particularly good because it needed no additives to create the blue color.



A Hemingray insulator

When Muncie's Ball Brothers Company owners decided that blue was good (because it limited the amount of sunlight that could pass through it and therefore might keep foods fresher longer), orders were sent north for this unique Hoosier Slide sand.

Soon the Ball company became closely identified with this shade of blue-aquamarine. No coloring additives were used: the glass formed this color quite naturally. For many folks then, the standard color for home canning jars was 'Ball Blue.' The Ball Company produced millions of Ball "Perfection" Mason and Ball "Ideal" jars, some in clear glass, but most of them blue.²³



If the glass companies discovered what impurities in Hoosier Slide sand made glass blue, they have not made it known to the public.

In any case, by the early 1920s, the Hoosier Slide was mined out and the source of this very special kind of sand was gone. In anticipation of this, and finding no other source of sand than

made "Ball Blue" jars, the Ball company stockpiled Hoosier Slide sand. This source allowed the continuing production of blue jars until 1936. After that the company went back to making clear glass jars.

Unfortunately much of the free natural gas in east-central Indiana had been wasted through unnecessary 24-hour heating, lighting, and flares. By 1902 so much gas had been consumed that underground gas pressures were noticeably dropping. By 1913, soon after Hoosier Slide sand started being used in the glass industry, Indiana was importing natural gas from West Virginia. By 1920, for the most part, Indiana had become a consumer rather than producer of natural gas. The gas boom was over.

Some glass companies continued making glass products in the state, but had to use other, and more expensive, sources of fuel. Ball ceased its glass making at the Muncie plant in 1962.²⁴ The Kokomo Opalescent Glass Company in Kokomo, however, is still in operation.

²¹ Minnetrista Cultural Center: "Colors of Ball Glass."

²² Ibid.

²³ Minnetrista Cultural Center: "Hoosier Slide."

²⁴ Minnetrista Cultural Center: "Colors of Ball Glass."