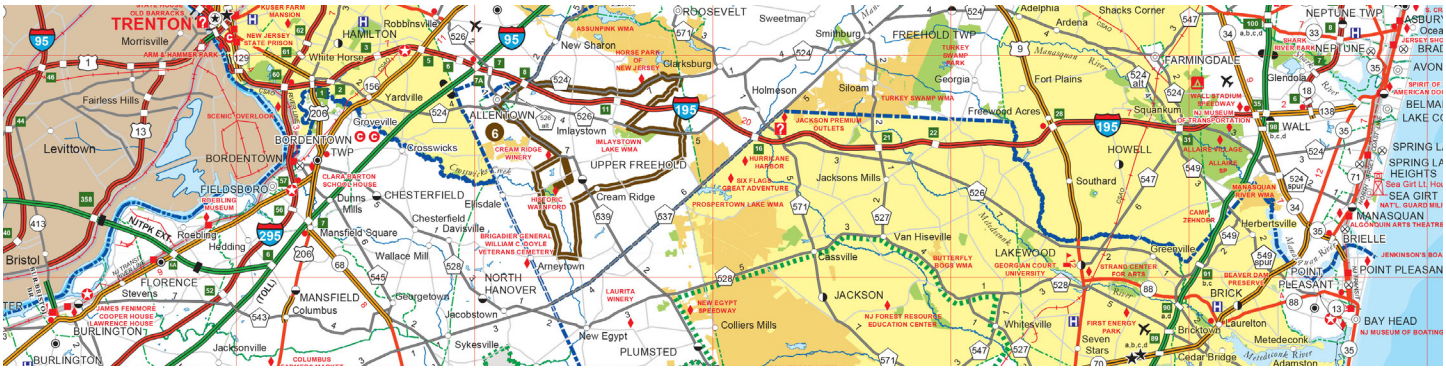

Journey to the Centers of New Jersey

Introduction

A perplexing question that comes up from time to time is: Where is the geographic center of New Jersey? The concept of a geographic center is important and has a long history in United States geography. In many cases, capitals were centrally chosen to be equidistant from all areas of a state. County seats were often selected for this same reason. In some states, the precise location of the center has been a point of contention. In 1834, for example, the State of Tennessee hired Professor James Hamilton to find its geographic center in order to locate the state capital as near as possible to it. Although Governor James Knox Polk wanted it moved southeast to Murfreesboro (Historical Marker Database, 2019), circumstances and politics left the capital in Nashville.

At the national level, in 1918, following the admission of Arizona and New Mexico into the union, the U.S. Coast and Geodetic Survey calculated the center of the conterminous states in their Special Publication 47 (Deetz, 1918). It lies in Kansas, just south of the Nebraska border, near the town of Lebanon in Smith County. Its coordinates are 39º 50' N latitude and 98º 35' W longitude. It is distinct from the geographic center of the United States, which reflects the 1959 additions of the states of Alaska and Hawaii. This geographic center is located about 20.8 miles northeast of Belle Fourche, South Dakota at 44º 40' 00" N latitude, 103º 51' 11" W longitude. Belle Fourche refers to itself as the "Center of the Nation".

Still other places made similar declarations. One was Rugby, North Dakota which in 1931 was declared to be the center of North America. This town erected a 15-foot stone monument in it's honor! More recently, 83 miles south of Rugby, a tavern called Hanson's Bar in Robinson, North Dakota laid claim in 2015 to being the center.

This debate between the towns drew national attention and piqued the interest of Dr. Peter Rogerson, a geography professor from the State University of New York at Buffalo (New York Times, 2017). In 2015 he published a new scientific method for calculating geographic centers and found that the center of North America, oddly enough, is smack in the middle of Center, North Dakota.

Methodologies

There are many variables in the process of finding a geographic center including history, geometry and geography. The accuracy and precision of the input data and the methods used to determine the center also influence the results, and therefore, produce different answers. Historically, before computers, the generally agreed upon way to determine the center of a geographic area was to find a balance point for a two dimensional plane with uniform thickness in the shape of the area. This is called the center-of-gravity method.

An accurate geographical center of the Garden State had not been determined until 1923. This first attempt to locate the center of New Jersey was calculated by E.M. Douglas of the U. S. Geological Survey (USGS). Using the center of gravity method, Douglas located the center of the United States and each of the 48

Figure 1. GIS Specialist Mike Girard planting the New Jersey State Flag on the E.M. Douglas 1923 center of New Jersey at the Yardville Heights Elementary School. *Photo by T. Pallis*

states. He placed the center of New Jersey five miles southeast of the State capital (Douglas, 1923). The Douglas 1923 geographic center of New Jersey is commonly taken to be in the Yardville Heights elementary school schoolyard in Hamilton Township, Mercer County, which is exactly five miles southeast of the state capitol (figure 1). According to F.P. Boscoe (1931), Douglas' values for state centers are clearly imprecise and of unknown accuracy because no details about the calculations are provided. The 1923 Douglas publication has been kept in print, largely

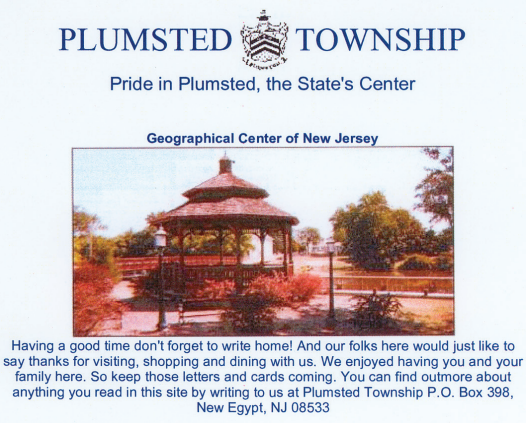

Figure 2. From Plumsted Township website, 2002.

without revision, to the present (Douglas, 1923, Van Zandt, 1966, Van Zandt, 1976, USGS 1995, and USGS, 2001, cited in Boscoe, 2001). In the 1966 and subsequent editions, the USGS recognized the complexities of determining geographic centers. These included the lack of a generally accepted definition of a geographic center, and no completely satisfactory method for determining it. Many factors, such as the curvature of the earth, large bodies of water, and irregular surfaces, affect the determination of geographic centers. Therefore the locations of geographic centers should be considered as approximations only (Van Zandt, 1966).

Geographical Centers of New Jersey

Timmins Mill, now known as New Egypt (Salter, 1890), in Ocean County was first identified as New Jersey's geographic center in 1936 by Henry Beck, who stated in his book, *Forgotten Towns of Southern New Jersey*, that Timmins Mill in Plumsted Township was the approximate geographical center of New Jersey. For many years, Plumsted Township referred to itself as the State's geographical center, as their website noted in 2002 (figure 2).

John Perry and his brother Allen looked into the geographical center issue during the 1990's after reading Henry Beck's book. To reinforce that the geographical center is in New Egypt, and near their farm, the brothers used a scale to find the center point on a map of New Jersey. They also noted that by folding a map of New Jersey from the highest point to its lowest point and then from its western and eastern most points, the area where the two folds meet is in the northwestern part of the township, on their Yuletide Christmas Tree Farm.

A short time after making his observations, John placed a metal marker adjacent to a parking lot behind his barn. The marker identifies the spot as the geographic center of New Jersey. It's coordinates are 40º 05'02" N Latitude 74º 32' 01" W longitude. At Christmastime the brothers put up a sign by the marker stating that New Egypt is the geographical center of the state (figure 3).

In 2015, Peter Rogerson's method was used to find the geographic centers of the contiguous United States and each of the states (Rogers, 2015). His method of finding the geographical center of an area minimizes the sum of squared great circle distances from all points in the region to the center. This entails (1) projecting regional boundary points using an azimuthal equidistant projection, (2) finding the geographic center of the projected two-dimensional region, and (3) transforming this location back to latitude and longitude. His method places the geographic center of New Jersey just south of I-195, on Back Creek, near Apollo Drive in Hamilton Township, Mercer County at 40° 11' 26" N latitude, 74° 40' 23" W longitude (figure 4).

In 2016, the New Jersey Geological and Water Survey (NJGWS) determined more precise geographical centers of New Jersey using ArcMap, a geographic information system. Before this was attempted, the boundaries needed to be determined. New Jersey, being a penninsula, has two options: the land-plus-water

Figure 4. Mike Girard planting the state flag near the Rogerson center of New Jersey. *Photo by T. Pallis*

Figure 3, *left*. John Perry, Yuletide Christmas Tree Farm owner, at the geographical center of New Jersey marker on his property. *Above*. Center of New Jersey monument, Yuletide Christmas Tree Farm, New Egypt, Ocean County. *Photos by M.W. Girard*

boundary and the land-only boundary (figure 5). New Jersey's land-plus-water boundary was based on boundary agreements with border states: Pennsylvania, New York and Delaware, and to the east the three-mile limit established by the Federal government in the Atlantic Ocean. The center-of-gravity (see page 4) point for the land-plus-water boundary data was determined to be at 40º 06' 22" N latitude and 74º 39' 34" W longitude. This location is just off of White Pine Road in Chesterfield Township, Burlington County. The calculation was run a second time using the land-only boundary. This gave a center of gravity location at 40° 10' 48" N latitude and 74° 39' 44" W longitude, near the corner of Woodside and Springdale Avenues in Hamilton Township, Mercer County (figure 6). This location is little over a mile southeast of the Yardville Heights elementary school and the 2015 Rogerson determination (figure 7).

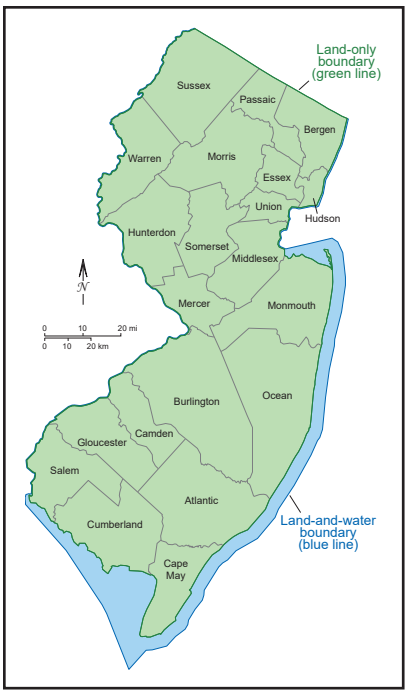

Figure 5. New Jersey's two boundaries: land-only and land-and-water.

In summary, the center point of New Jersey depends entirely upon the method used by the investigator. It is a question with multiple answers, none of them wrong. It appears reasonable though, that a point somewhere in Hamilton Township, Mercer County can be considered the geographic center of New Jersey as there is a clustering of proposed centers there (figure 7). Unfortunately, most of these sites have no markers, plaques, or other indicators to let you know you are at the center of anything. Perhaps someday this will change and New Jersey will have a monument at a popularly recognized and accepted geographic center.

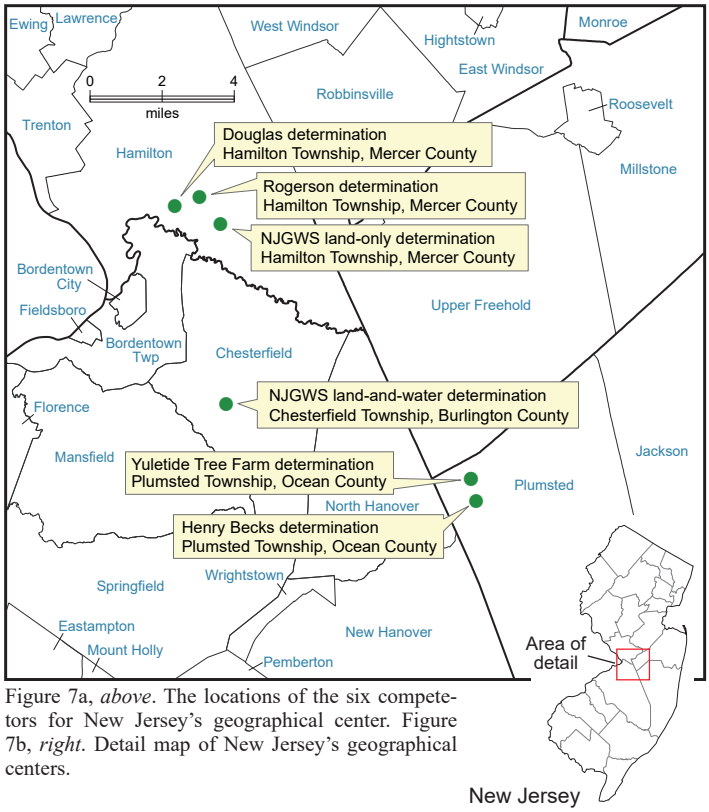

Figure 7a, *above*. The locations of the six competetors for New Jersey's geographical center. Figure 7b, *right*. Detail map of New Jersey's geographical centers.

Figure 6. GIS Specialist Ted Pallis holding the state flag at the corner of Springdale and Arlington Avenues in Hamilton Township, Mercer County near the ArcMap land-only center of New Jersey. *Photo by M.W. Girard*

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Determining Center-of-Gravity

To find the center of a shape, like New Jersey's land-plus-water boundary, the computer calculates the center-of-gravity, which is the point around which all the weight of the shape is in perfect balance.

A simplified example of what the computer does to determine center-of-gravity is demonstrated by this experiment:

A shape is cut out of poster board, in this case, New Jersey, but it could be any shape. A t-pin is pushed through the poster board shape, near the edge, and wiggled to enlarge the hole so that the shape spins freely on the t-pin. The t-pin, with the shape speared on it, is pinned to a cork board. A plumb line is created by tieing a piece of string to a weight, such as a washer. A loop is tied at the opposite end of the string. The loop is positioned on the t-pin so that the plumb line, the shape and the cork board do not touch (figure 1). When the plumb line and the shape hang still, mark the plumb line's position at the edge of the shape opposite the pin. Draw a straight line connecting the pinhole and the mark (position A). This is repeated two more times repositioning the pinhole along the border (positions B & C). The center-of-gravity is located where the 3 lines intersect. This method of finding the center-of-gravity is not as precise as the computer which will use exact coordinates from the border to do the calculations.

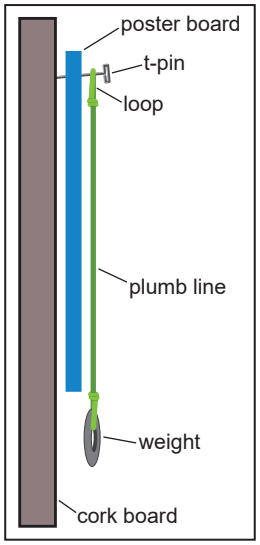

Figure 1. A plumb line and a cut-out of New Jersey's land-plus-water border stacked on a t-pin, pinned to a cork board with none of the elements touching.

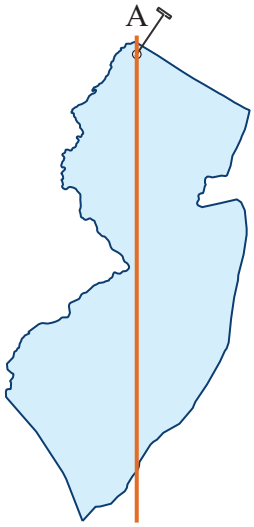

Figure 2. First position, "A". After marking the plumb line position, the pinhole is moved to another position along the border ("B"), marked and then moved to a third position ("C").

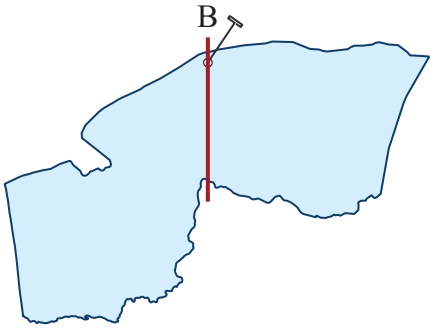

Figure 3. Second position, "B".

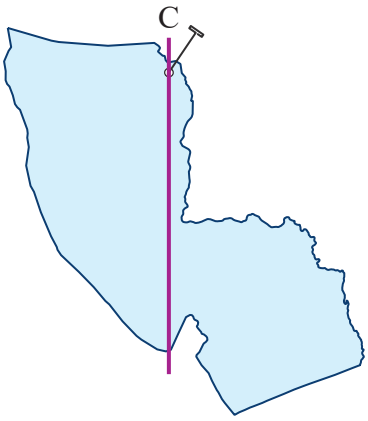

Figure 4. Third position, "C".

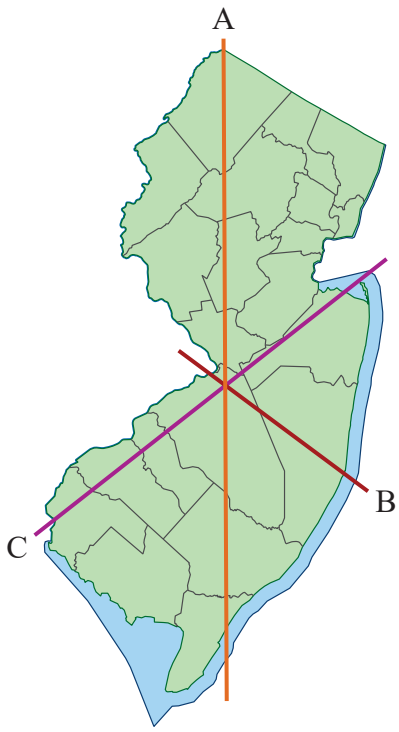

Figure 5. Results from A, B & C are combined, their intersection is the center-of-gravity for the shape. The position of the intersection on this map is Mansfield Township, Burlington County, just south of Chesterfield Township.

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This information circular is available upon written request or by downloading a copy from the NJGWS website.

Banner: Detail of central New Jersey from *2018 Official State Map*, New Jersey Department of Transportation, 2017.

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2019