

Why the Four Corners Monument is in exactly the right place

NOAA, National Geodetic Survey

Recent media reports incorrectly stated that the location of the Four Corners survey monument—marking the point common to Arizona, Colorado, New Mexico, and Utah—is in error by 2.5 miles and suggested that the monument therefore does not correctly mark the intersection of the four states. These reports also erroneously attributed the discovery of this supposed error to the National Oceanic and Atmospheric Administration’s (NOAA) National Geodetic Survey (NGS). NGS did not, in fact, make any claim or pronouncement that the monument is incorrectly located or suggest that it should be relocated. NGS has, however, worked with the media to correct inaccuracies in the initial reports, clarifying that the distance between the actual location of the monument and its intended location is substantially less than the reported 2.5 miles, and that—as affirmed by the Bureau of Land Management (BLM)—it does indeed correctly mark the four-state-intersection point. Because NGS was specifically named in the reports, this brief document was prepared to present some pertinent facts and history about the Four Corners monument and its placement.

In 1875, a surveyor named Chandler Robbins was contracted by the U.S. General Land Office (GLO), the BLM’s predecessor, to survey the entire boundary between the territories of Arizona and New Mexico, from the U.S.-Mexico boundary to the 37th parallel of latitude north of the equator. He was charged with also establishing, at the boundary’s northern terminus, the Four Corners monument, as it would be known upon completion of the other territorial boundary surveys terminating there. Robbins was directed to base his survey on the geographic coordinates of Ship Rock (a prominent northwestern New Mexico landform), which had been determined the previous year during the decade-long U. S. Geographical Surveys West of the 100th Meridian, led by First Lieutenant George Wheeler.

An 1863 Act of Congress, signed by President Lincoln, which separated Arizona from New Mexico, specified that the dividing boundary should be coincident with the 32nd meridian of longitude west of the Washington (DC) Meridian. The Washington Meridian, which had been in use since 1850, was defined as bisecting the dome of the old Naval Observatory, situated at a longitude of 77 degrees 03 minutes West (for simplicity, longitude values presented here are rounded to the nearest arc minute). In fact, the boundaries of 11 western states are similarly longitude-referenced to the Washington Meridian, and not the Greenwich Meridian. This practice was in place in the U.S. until 1912, when our nation adopted Greenwich as its standard longitude reference.

Hence, what Congress had specified for the Arizona-New Mexico boundary, and the Four Corners monument, was that they should be established at a longitude of 109 degrees 03 minutes West, as referenced to the Greenwich Meridian.

Therein, we believe, lies the source of the invalid report of a Four Corners monument location error of 2.5 miles. Some people apparently relied on the incorrect premise that the marker was originally intended to be located at a longitude of exactly 109 degrees West. But, Robbins followed his marching orders correctly, and the Four Corners monument was established at the point he determined, to the very best of his ability and using the available technology, to be the prescribed location of 109 degrees 03 minutes West longitude and 37 degrees North latitude. There, his meridian survey intersected the 1868 New Mexico-Colorado boundary survey, which ran along the 37th parallel.

Nonetheless, there remains the question of how close the Four Corners monument is relative to its intended location. In fact, there is a discrepancy between the actual location, which we know to a high degree of accuracy, and our best knowledge of where it was intended to be located. But, instead of a 2.5-mile discrepancy, as reported in the initial news items, this offset is in fact only about 1800 feet, or less. Not only is the offset only about one-tenth of the alleged location error, it is in the opposite direction; the intended monument location is west of the actual monument. There is, however, uncertainty in precisely quantifying the relationship between the intended and actual monument locations due to changes, since 1875, in some technical details of the geodetic reference systems utilized. The actual offset might in fact be considerably less than our estimate.

Regardless of the technical nuances, we can confidently say that, considering the relatively primitive surveying technology of the day, the remote and difficult prevailing field conditions, and uncertainty in the survey’s beginning coordinates for Ship Rock, Chandler Robbins’ survey was a resounding success. He “nailed” the location of the Four Corners, to the best of his ability, using the tools and information available to him at the time.

Finally, we cannot overemphasize the fact that the aforementioned technical geodetic details are absolutely moot when considering any question of the correctness or validity of the Four Corners monument in marking the intersection of the four states. Indeed, the monument marks the exact spot where the four states meet. A basic tenet of boundary surveying is that once a monument has been established and accepted by the parties involved (in the case of the Four Corners monument, the parties were the four territories and the U.S. Congress), the location of the physical monument is the ultimate authority in delineating a boundary. Issues of legality trump scientific details, and the intended location of the point becomes secondary information. In surveying, monuments rule!

This is an abbreviated version of a document posted on the NGS website, at: <http://www.ngs.noaa.gov/INFO/fourcorners.shtml>. For additional information, please contact William Stone, NGS, at: william.stone@noaa.gov.