

Mapping Tombstones at Springwood Cemetery by Age and Stone Type

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Abstract

Measuring the weathering rates of tombstones has become a fairly common practice for geomorphologists because they provide an easily accessible proxy for the naturally exposed petrology of a region. Marble tombstones in particular are targeted for this kind of data collection because they weather more rapidly and uniformly than tombstones made from other stone types and, and they are very common. They are also especially chemically sensitive to levels of air pollutants, like SO_2 , which precipitates from the atmosphere as acid rain, making them useful for those trying to gauge damage to other stone architecture. Springwood Historical Cemetery in Greenville, South Carolina is a prime location for data collection of this type because it not only has a large number of marble tombstones, but also tombstones of different stone types whose weathering rates can be compared to the marble stones as a standard. The cemetery is also very old, with internments dating from the 19th to 21st centuries, so differential weathering rates can be compared over a long period of time. The goal of this project is to develop a method by which tombstones of a particular stone type and/or age range can be located easily by geomorphologists or students collecting data in the field, and to determine if there is a correlation between tombstone age and stone type.

Mapped Areas of Springwood Cemetery



Figure 2 – A map of the entire cemetery showing areas that were investigated.

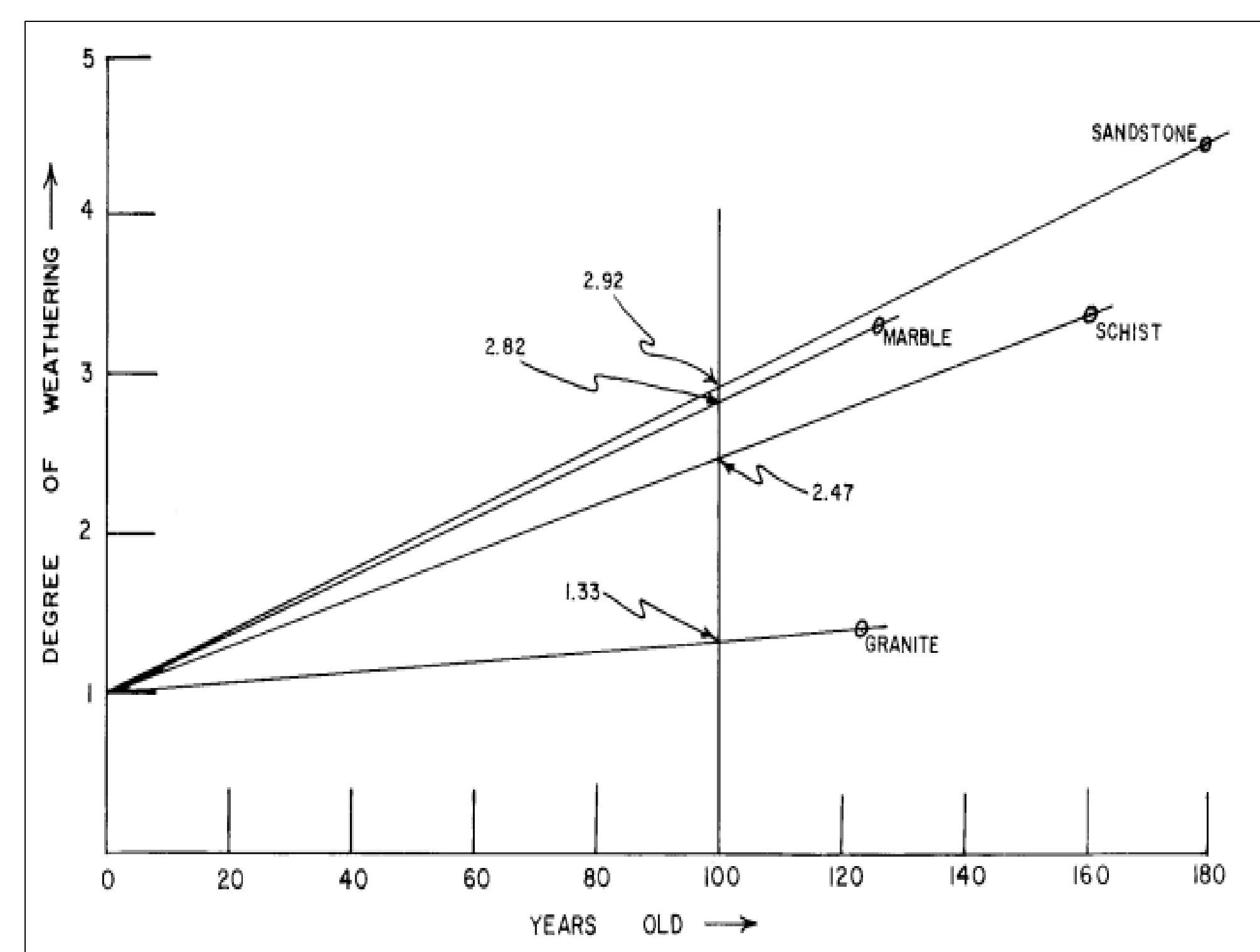
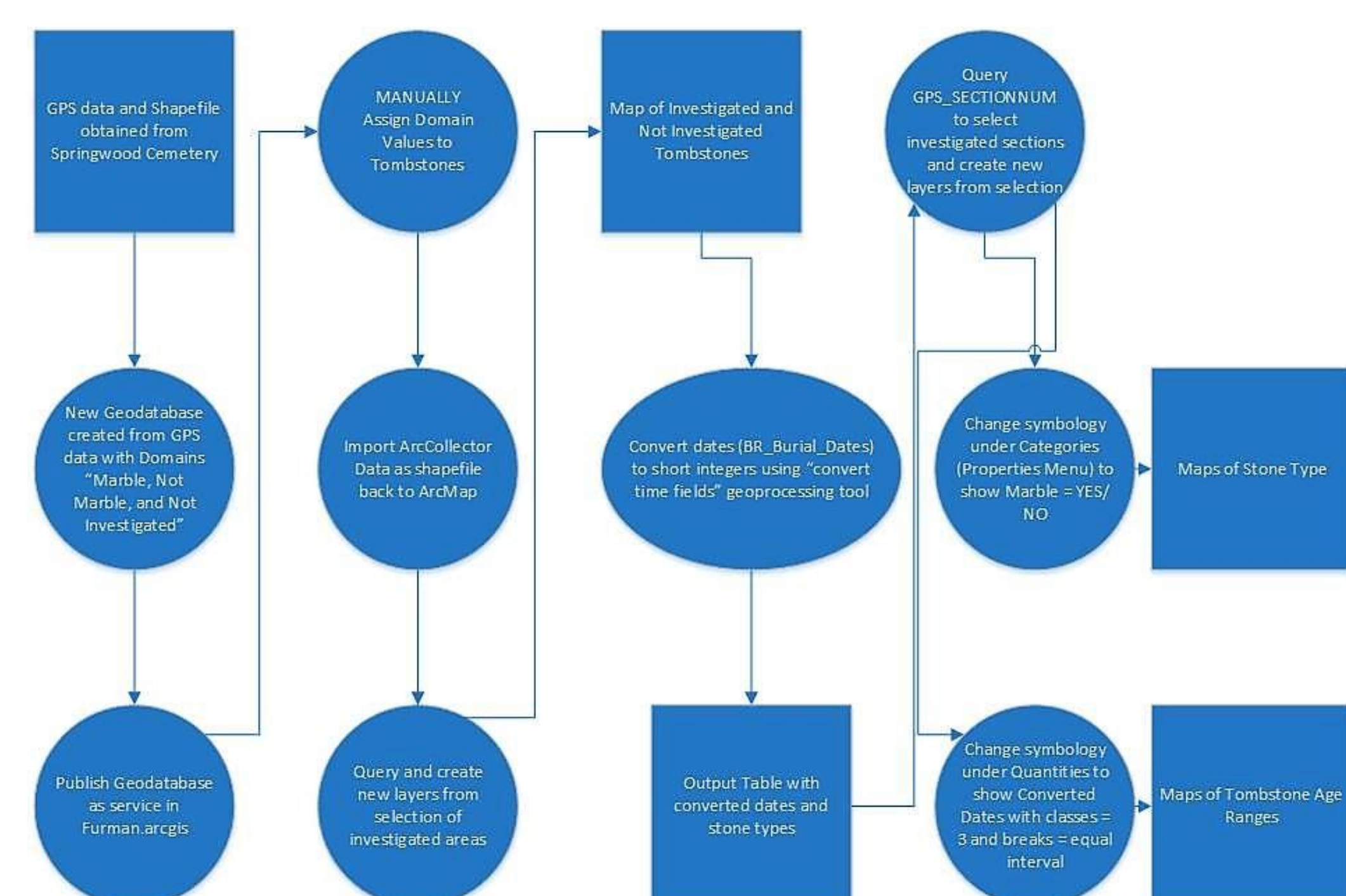
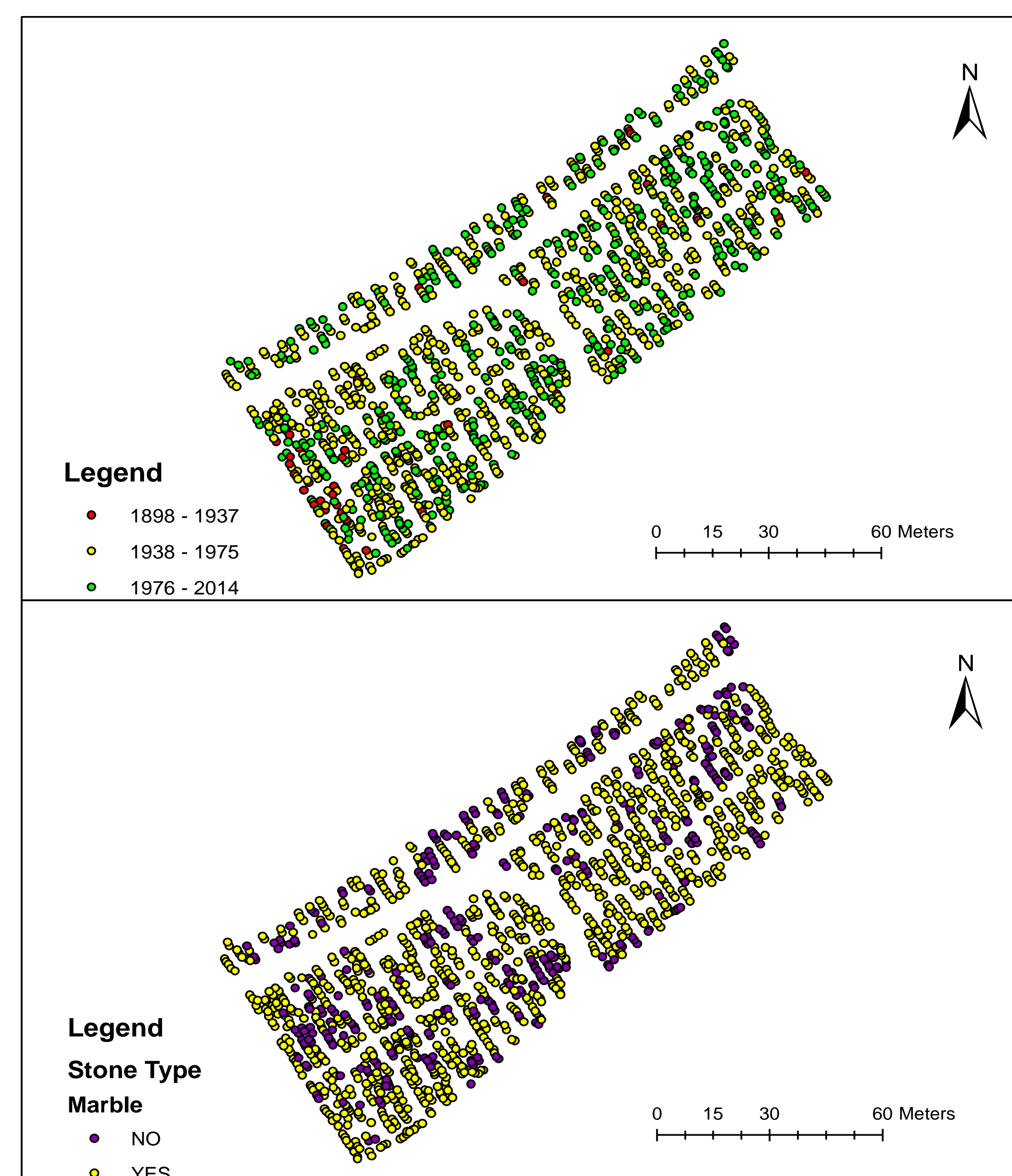


Figure 1 – This graph depicts the relationship between the average age and weathering rates of four common tombstone lithologies (Rahn, 1971).

Methods



Sections U, T, and S



Sections B and F

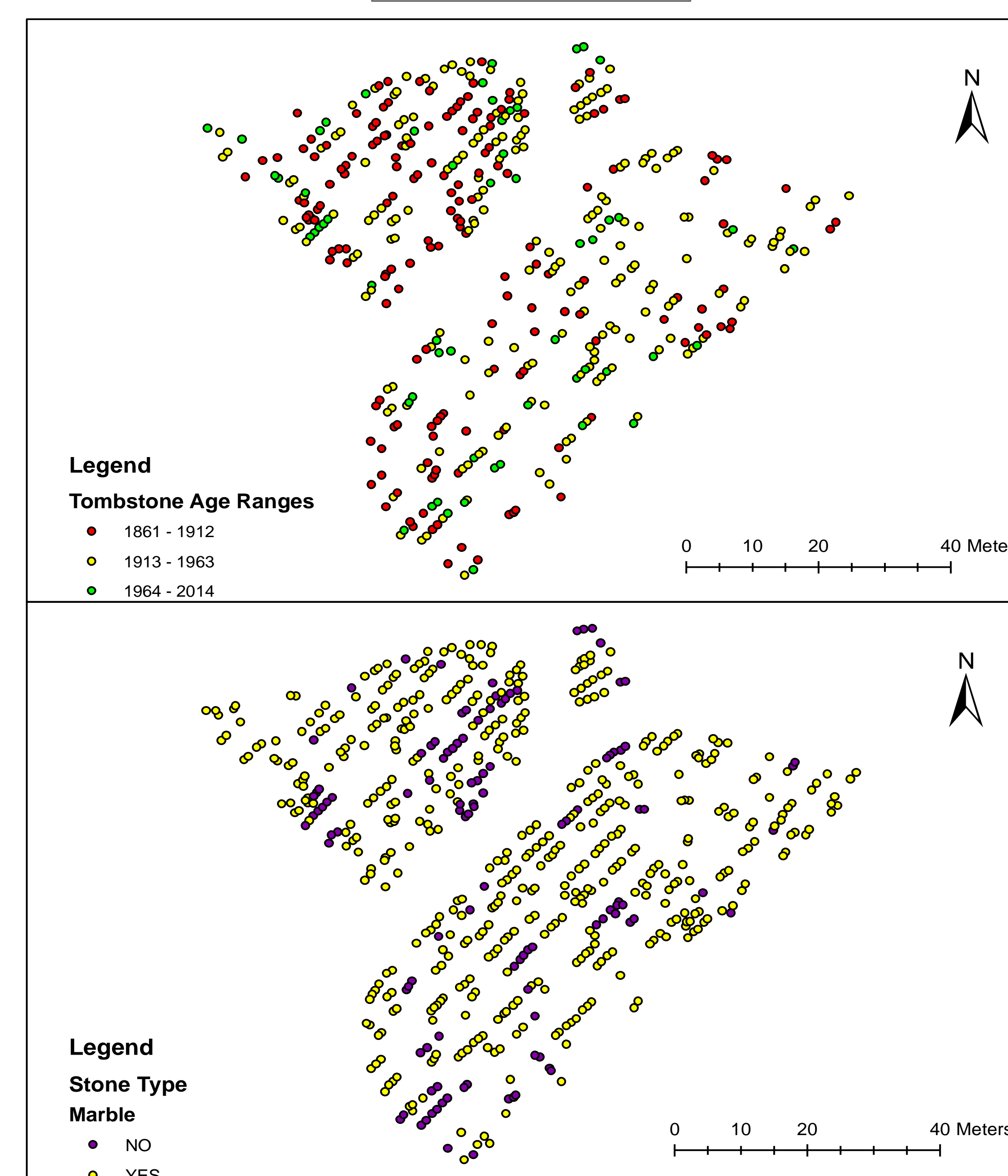
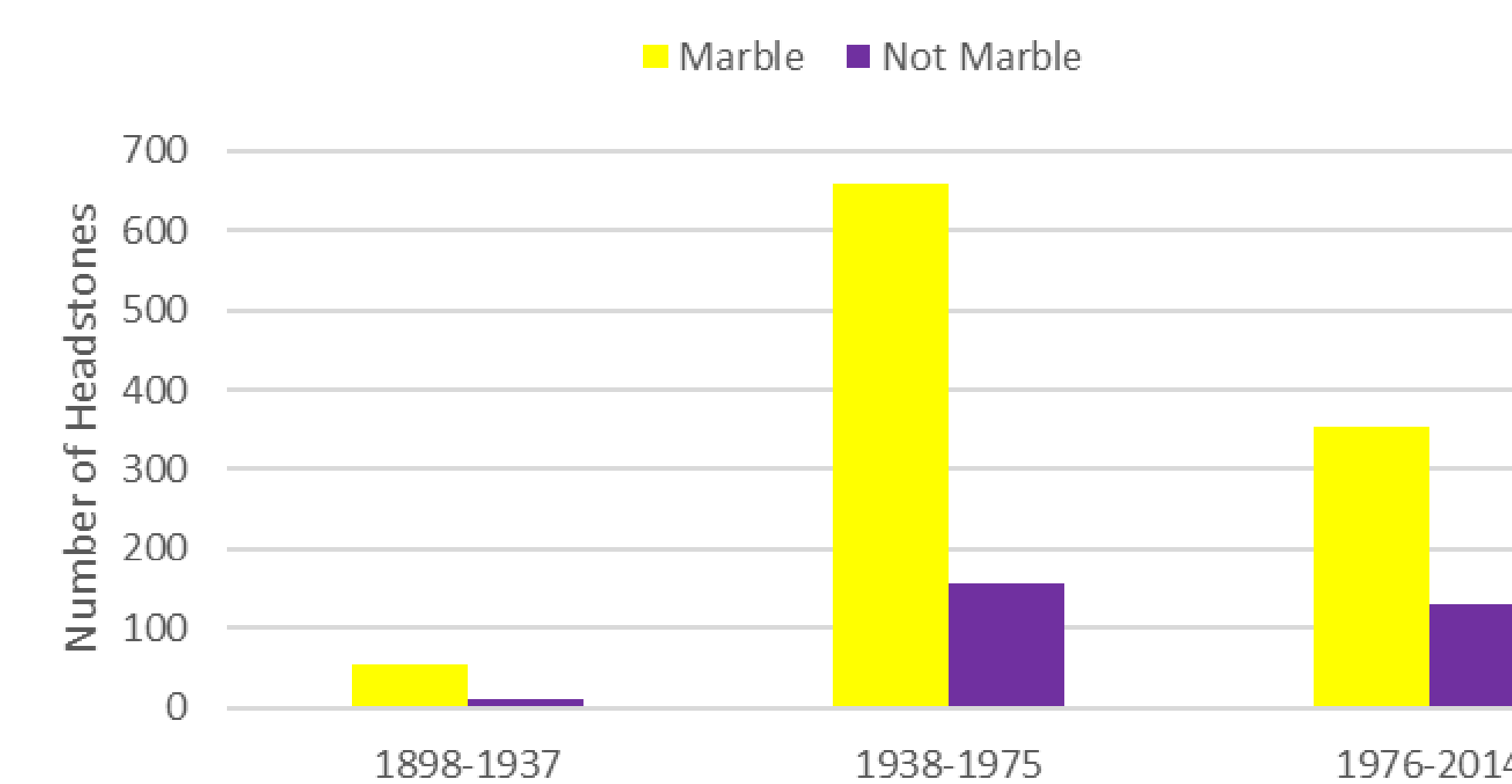


Figure 3 – These maps show the age ranges and identify marble tombstones versus not marble tombstones for the two major areas that were investigated as shown in Figure 2.

Frequency of Marble vs Not Marble Headstones by Age in Sections U, T, and S



Frequency of Marble vs Not Marble Headstones by Age in Sections B and F

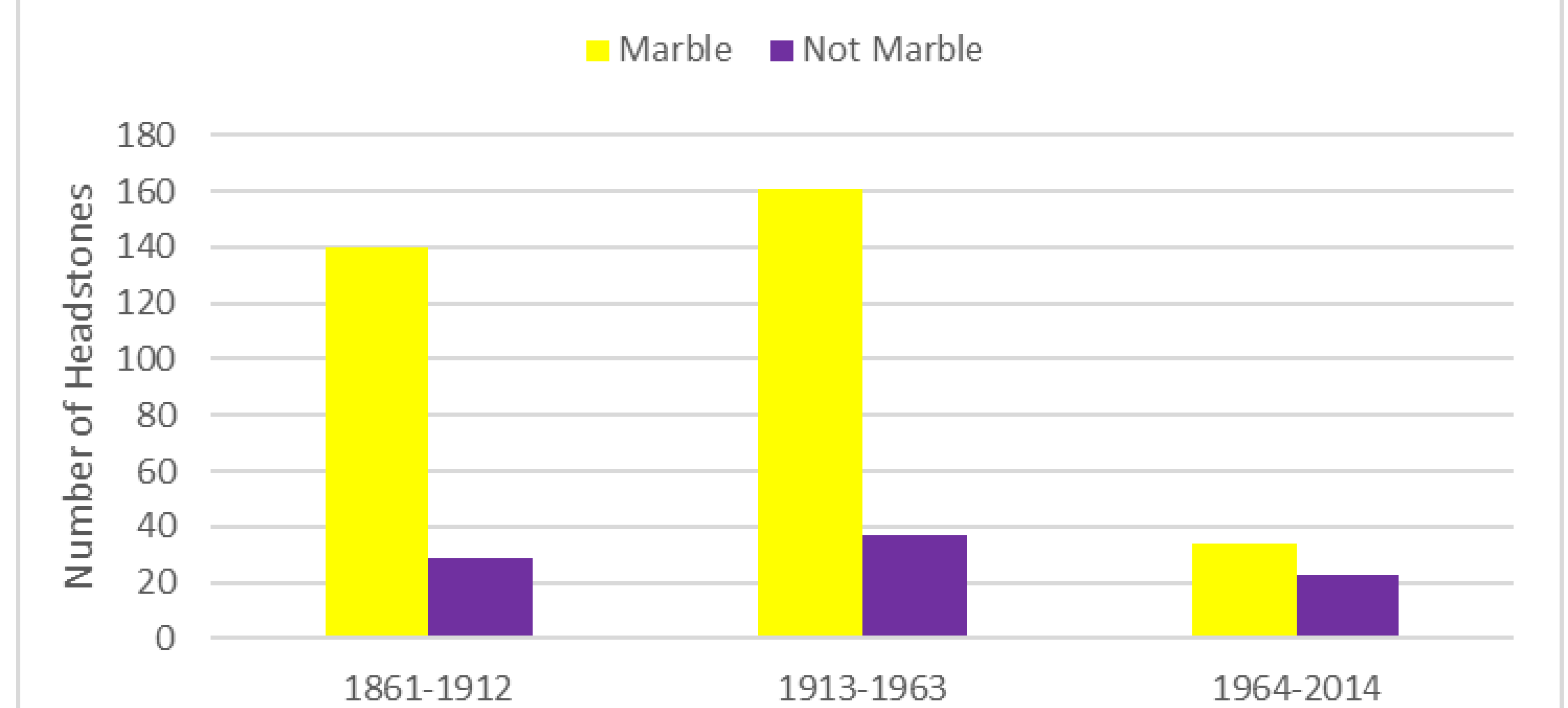


Figure 4 – Graphs showing the number of marble headstones and not marble headstones within each age range class of the two investigated populations.

Methods (continued)

The subsections that were selected for investigation were chosen because they represented different age ranges of tombstones. Sections B and F had a more evenly split number of tombstones within each age range than other sections of the cemetery. This made them a useful control for sections that were dominated more by one or two age ranges, such as U, T, and S, which were chosen because they contained mostly younger tombstones. Whether or not each tombstone was marble was determined by viewing of photolinks in the Springwood Cemetery Viewer, and that data was then entered via the ArcCollector app in Furman's GIS page. By running a series of queries once the marble and not marble tombstones were identified, the necessary statistics were gathered to create the graphs in Figure 4.

Conclusion

By creating an ArcCollector App, it was possible to identify tombstone lithologies on the fly. Fortunately, Springwood Cemetery already had an aerial view of the cemetery grounds with photopaths so in situ investigation was not necessary. In the sections investigated, marble tombstones were far more common than any other lithology. It was also established that there is a strong correlation between age and tombstone type within the investigated sections, with marble becoming increasingly more prevalent as the tombstones got older. The correlation was almost uncanny – in both section groups, the ratio of marble to not marble in the oldest two age ranges was around 4:1 to 5:1. In the youngest age groups, the same respective ratio was closer to 2:1. Using this data, geomorphologists could create graphs of weathering rates similar to Figure 1 for each age group. By doing this, it would be easy to see if weathering rates have changed over time. The hypothesis would be that weathering rates have increased due to increased air pollution.

References and Data Sources

Data gathered from City of Greenville GIS (greenvillesc.gov)
 Rahn, Perry H. "The weathering of tombstones and its relationship to the topography of New England." Journal of Geological Education 19.3 (1971): 112-118.

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