

Assigning Vadose Zone Core Locations

1 INTRODUCTION

This method describes the processes used to assign latitude and longitude coordinates to soil core samples collected for vadose zone monitoring when GPS coordinates have not been provided or when provided coordinates are not in decimal degrees.

2 SCOPE AND APPLICATION

Because sampling has been and continues to be performed by different organizations and people, field logs and records submitted to the Nebraska Water Sciences lab may not have standard location data. This is particularly an issue with historical data collected before GPS was commonly used. Historical data may only contain a street address or Public Land Survey System (**PLSS**) description. GPS data may also have been collected in a coordinate system other than decimal degrees (latitude and longitude).

Confidence in location determination will be noted as “Location Accuracy” in data. Standard commercial grade GPS unit accuracy is assigned a 2-4m accuracy (based on USGS guidance, <https://water.usgs.gov/osw/gps/>) and other accuracies (within a quarter, half or full section) are assigned accordingly.

3 REQUIRED TRAINING

Data analysts should read this SOP, and be supervised by a GIS specialist when performing this process for the first time.

4 EQUIPMENT AND MATERIALS

4.1 Software

ArcGIS license

4.2 Datasets

Shapefiles of Nebraska PLSS quarter sections (polygon and point* features)

* Centroids and their latitude/longitude coordinates were computed from the quarter section shapefile using standard ArcGIS processing tools.

5 SAFETY PRECAUTIONS

None

6 PROTOCOL

6.1 Assigning geographic coordinates based only on Legal descriptions

6.1.1 Assigning core location to quarter section centroid

- Create an Excel file with the following syntax for the legal description - T11NR04ES23SW
- Join to the point feature shapefile (sec_qtr_pt)
- Export joined points to new shapefile, which now includes lat/long coordinates
- Assign location accuracy to 'within a ¼ section'

6.1.2 Assigning core locations to appropriate half section centroid (for a single location)

- Using polygon shapefile (section_poly), select applicable quarter sections (e.g. SE & NE) and create new shapefile containing only those 2 quarter sections.
- Dissolve to create a new ½ section polygon
- Calculate new centroid for ½ section
- Create Lat (Y)/Long (X) fields (double integer) in attribute table and Calculate Geometry for new points (make sure coordinate system is set to GCS NAD83)
- Assign location accuracy to 'within a ½ section'

6.2 Converting coordinates to decimal degrees.

- Reproject shapefile to WGS 1984 Web Mercator (Auxiliary Sphere)
- Create new latitude and longitude fields in shapefile Attribute Table and calculate geometry for the new fields.

7 QUALITY CONTROL

7.1 Resolving GPS coordinate and legal description conflicts

When GPS coordinates and legal descriptions do not match (following QA/QC using ArcMap or ArcGIS Pro):

7.1.1 Examine the source of original data

- a) Was data originally hard copy and then manually entered into database? Check for data entry errors and examine any relevant graphics showing coring locations..
- b) Were GPS coordinates acquired in the field or calculated from the legal description? If calculated, verify that process was done correctly (e.g. determining appropriate polygon centroids in ArcMap/ArcGIS Pro).
- c) Were GPS coordinates converted from a format other than decimal degrees? Check conversion of original data.

- 7.1.2 Examine land use - review Google Earth imagery to verify land use listed in original data. Make sure the date of imagery is approximately around the time frame of data collection (e.g. a core sampled in 1993 may not have the same land use at present).
 - 7.1.3 Accept legal description as most likely location if land use information matches. Adjust location accuracy to reflect basis for location determination.
- 7.2 Converting provided location coordinates into decimal degrees (latitude and longitude)
Verify correspondence of new coordinates with provided legal description and reported land use for 10% of converted core coordinates.

8 ADDITIONAL INFORMATION

Contact Milda Vaitkus, GIS Research Specialist at University of Nebraska-Lincoln, for shapefile of centroids of quarter sections.

319 Hardin Hall
School of Natural Resources
mvaitkus1@unl.edu
402 472-0306

9 PREVIOUS ISSUES AND CHANGES

Document File Name	Issue	Issue Effective Dates	Author

10 DIAGRAMS, FIGURES AND PHOTOGRAPHS
