

# Geo-referencing Solutions

## County Numbering - CRITICAL

[Texas County Numbering](#) is a word doc that lists the lab standard for mapping from numbers to counties. Good to print out and keep handy.

Or, you can view them in the wiki at [Texas County Numbering](#).

## Specimen Prefixes and Numbering

See [detailed document](#) by Jennifer Olori, June 2006-August 2008

## Place Names

Some place names are easy, like "Hwy. 16, 2 mi. north of Dripping Springs, TX". You can just use Geolocate or Google Maps to search for them.

Google Maps has some advantages - you can for example find a street without putting in a specific address number, something Geolocate doesn't support. However, for many features like creeks and mountains the more useful site is the [USGS Geographic Names Information System](#). This will find most names that have appeared on both current and older USGS topo maps.

Within most of the mapping tools there is a place to input a place description or GPS coordinates. Some tools require lat/long coordinates to be separated by a comma, others are happy with a tab or multiple spaces.

Many place names used in the location descriptions we see are defunct or reflect local knowledge and naming conventions. And sometimes are wildly idiosyncratic. We have found places that were of the form "Two lots east of X's house, Austin". Turns out X was in the Geology Department and by digging into phone books for Austin from that time period (in Ancestry) we were able to nail down a precise address.

Another recurring problem are ranches, for example "SE corner of Schmidt Ranch, Presidio Co." for a fossil that was collected in 1922. Some ranches show up with names on old topo maps. Or you may be able to use historical information to track them down - sometimes the [Handbook of Texas History](#) can help. But often these ranch names are a dead end.

One final source: If a specimen associated with the site occurs in a publication, that paper will often contain more precise location data. Or sometimes just additional information that can reduce the uncertainty radius. Some of the older publications include maps with place names that we have found nowhere else. Some of the maps in Plummer publications seem particularly prone to using names for towns, schools and churches found nowhere else. See [Stratigraphy of the Pennsylvanian Formations of North-Central Texas](#), by F. C. Plummer and R. C. Moore. NPL has a copy in the library under UT Bulletin 2132.

## Locality Numbers

Locations of the form **122-T-13** are specific NPL sites that are recorded in card files in the curator's office. The form is *[county number]-[state]-[site]*. You may see these locations for other states. Given that these are well known, they will normally already be nailed down in Specify. Note that this is not always true. In particular, some of these locations are described on more than one card, sometimes with varying levels of detail. These are also available in a spreadsheet at Z:\DocLib\GeoReferencing\BEG-Localities-Cards - especially useful **if working remotely**.

There are other location formats used in some of the scanned BEG, King, Plummer, etc. catalogs on the Z: drive (Z:\Doclib\Catalogs). Plummer and Moore often used ones like **56.3** - it turns out these show up in the lists of locations in some of their papers. The catalogs on the Z drive were often the source for data entered into Specify. The original text may contain information that was left out during transcription.

Charles Newsom's locations are very detailed and are linked to topo map images. See Z:\Databases\charlesnewsom\Personal\Fossil Databases\Master File.

See more detail in [Numbering Schemes for Locations and Specimens](#).

[Carboniferous location codes from San Saba](#). These are summarized in Gries 1970 and include locations from Humble 1955-1957, Oden 1958, Rose 1959, Defandorf 1960, Kuich 1964, and Turner 1970. They include location identifiers of the form OC-1, LK11-2, T-143, ...

## GPS Syntax

Most of the sites that take GPS coordinates are flexible as regards format. Geolocate is an exception. It does not like a tab as a lat/long separator.

Getting GPS coordinates can be a pain (or impossible) in some tools.

1. Geolocate is easiest - the place marker location and uncertainty radius show up in the text box on the lower right side.
2. In Google Maps you can search for a place like "Sandy, TX", then clear the search box (click the x) and then right click on a location and select 'What's here'. And then copy the GPS coordinates that show up.
3. Topoview shows lat/long at the bottom center of the window, but in the default mode, these coordinates are wherever the mouse is. So if you move the mouse to select it, they change. However, if you select 'Spot Elevation' (the middle button at the bottom center of the page, with the mountain image), the lat/long just above is fixed according to the location under the center circle, and with a somewhat sensitive mouse click you can copy it.
4. The USGS Historical Topographic Map Explorer does not show them at all.

For those interested in GPS system details, in particular matching map data to field GPS data, [this USGS page](#) is useful. Also gives a brief introduction to WGS84 vs. NAD27 vs. NAD83.

## Blocks and Sections in Texas

Texas land descriptions pre-date the US Public Land Survey System. So go to [Texas Land Survey Searches](#) for things like "Block 122 Section 14 in Pecos Co". We still have not found a good source for Spanish Land Grant locations. Might try this site at the [Texas General Land Office](#). We have not explored it in any depth.

To convert from PLSS to GPS, see [Legal Land Converter](#)

We did find data on Texas historical measurements from Spanish land grants at the [History of Texas Public Lands](#). Stephen F. Austin's early surveying contracts required that he use the vara as a standard unit. The vara can be seen in many deeds as late as the mid to late 1900s. Early grants regularly included a league and a labor, so on old maps areas of 4428 acres and 177 acres are signs of grants made before Texas independence and for some time after, even up to distributions of land to Confederate veterans.

- vara : length = 33 1/3 inches. 1 yard = 1.08 vara.
- league : area = 5,000 varas squared. About 4,428.4 acres (1,792.11 ha).
- labor : area = 1 million square varas. About 177.1 acres (71.67 ha).
- league : area = 25 million square varas. About 4,428.4 acres (1,792.11 ha).

## Wells and Leases

The UT Bureau of Economic Geology (BEG) has a database for samples from cores plus well logs. NPL regularly has specimens derived from these cores at depth. The BEG site does not normally provide GPS coordinates for *samples*. However, if you can find a well *log* for the appropriate well, they often do have GPS data. Barring that, once we have gone through everything we will accumulate a list and BEG will track these down.

It is important to remember that because these samples are from below the surface, the formation will not normally coincide with surface data from the geology maps.

It is sometimes possible to get a well location using the Railroad Commission web site.

## Depot and Station

If you see something like 'Chispa Station' or 'Boggy Creek Depot', it is probable that they refer to train stations. The likelihood of this is related to the collecting date - older ones are more likely. If there is no date, you might look at the collector. Based on when various UT geologists were active you can sometimes figure out a reasonable date range. See [the list at NPL](#).

Age can really matter. We had a location in 'Cherokee Territory, Texas'. Made no sense until we realized the collector was active prior to November, 1907 when Oklahoma became a state.

To find a "depot" use the [Historical Topo's](#). Depots are aligned along the railroad right-of-way (ROW) and are almost always rectangles. It is a good guess that a rectangle in the middle of an old town that lies along the ROW of a railroad was the depot for that town.

Note that "summit" is sometimes used to denote the high point on the line. For example "Chispa Summit" is not the depot at Chispa in west Texas, but on the track to the west. To identify this we were able to find the publication describing a specimen associated with this location that contained a map with that specific location.

## Benchmarks

These show up on topos. They can be hard to find and perhaps more importantly are not unique. You need more than just 'benchmark 2075' to identify these. Something like 'Benchmark 2075 on the road north out of Lajitas'. You need to scan the USGS Topo maps for the little benchmark sign (an x) with the right height.

## Apparent West Texas County Errors

We have encountered a number of spots where the collection notes seem to be in error regarding the county. Some annotators seem to have defaulted to Travis Co. when they could not figure out a county. Take the county with a grain of salt and if you can be reasonably sure an entry is incorrect, fix it.

NOTE: County boundaries have changed over the years. In particular, specimens collected in west Texas between 1890 and 1917 may be affected by such changes. Changes to counties were still being recorded in the 30's. See [Atlas of Historical County Boundaries](#), [The Newberry Library](#) and [Individual Texas County Chronologies](#)

## Formation Names

A Google search may work, but a more reliable site is the [USGS Database Geolex Search](#). Enter a formation name, select a state (e.g. Texas), and search. It returns alternate names, as well as group and member names. It can be a bit funky. E.g. searching for "San Carlos" turns up the formation, but additionally any entry that contains "san". Fortunately, those that begin with the search term come first. Note that there is a lot of information here. It includes important publications containing the unit, as well as in some case an archives link which produces a pdf with images of references. Apparently from the USGS Geologic Names Committee Archives.

## Uncertainty

Use the Geolocate tool for this when you can reasonably add it. Click on the green location dot and select "Edit Uncertainty". The third number in the lower right text box is the radius of the circle you draw. Normally in meters.

Sometimes we may get down to somewhere in two or three counties. Rather than enter a specific county the convention is normally to leave this as 'unspecified locality, Texas' rather than doing something like 'Presidio-Brewster-El Paso Counties'.

It has sometimes been possible to reduce uncertainty by checking where the specified formation crops out in a particular county. For example, the only outcrop of Cretaceous age formations in Lamb County is a small area in its SW corner. Given a location description that only consisted of "Lamb Co.", if we know that the associated specimens are from the Kiamichi fm. we can vastly reduce locality uncertainty, as well as improve the GPS center.

### **Converting from Universal Transverse Mercator (UTM) to decimal degrees.**

We ran across a set of specimens recorded by Moore that used UTM to describe their location. We used the process described on the page below to convert them.

[Convert UTM.](#)