GEOREFERENCING AT LOUISIANA STATE UNIVERSITY HERBARIUM

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*Georeferencing is only valid for locations below the level of county/parish.

*Cultivated specimens should not be georeferenced.

*Batch GeoLocate did not always include information in the municipality/named place field. LSU Records should always have any municipality data repeated in the Locality field before georeferencing.

*When searching prior work, use edit tool (pencil); The wildcard is "%"; be sure to sort descending "date modified" under "GeoRef By = Not Null".

*If you are overwriting an existing lat/long from label. Record the original coordinates in Verbatim Coordinates and comment in Geo Remarks.

GEOREFERENCING FIELDS

Latitude & Longitude: The center of the narrowest named place, the center of the uncertainty (point radius method), or the best location from the detailed location description. These are ALWAYS in Decimal Degrees (DD). For DD, use negative for S or W.

Verbatim Coordinates: These can be in various formats (DD, DMS, DDM), TRS, or UTM and transferred from the TOOL fields.

If original coordinates are found to be incorrect, place them here and state ie.,"original coordinates = 30.2343254 N, 90.899787 W". In Georef Remarks you can explain anything further, ie., "original coordinates not used because location states South of railroad, not North".

Note that for some records, original coordinates have been checked prior to georeferencing and already state in Verbatim Coordinates: "Coordinates inaccurate or low resolution on label". These DD lat/longs have been cleared and are ready for georeferencing.

Elevations: These can be entered in any format, but they are recorded (and transformed) to meters. If only one elevation is given, place in LOWEST elevation. If elevation is "sea level", enter it in Verbatim Elevation and place a zero in Lowest Elevation.

Datum: Use "WGS84" for most online recent maps, google, ACME etc.

Uncertainty: This is the radius of the circle. Only recorded in meters (m). Conversions: 1600 meters = 1 mi.; 800 meters = ½ mile; 2 km = 1.24 mi.; 1mi. = 5,280 ft.
city uncertainty = 5,000 m usually;
GPS before 2 May 2000 is 100m, after date is 30 m;
Degree Minutes only (no Seconds recorded) has a large uncertainty of approx. 2,500 m; (We may want to consider officially georeferencing these records in the future).
offset from 2 distinct paths = 0.5 mi.;
offset from defined trailhead = 10 m.
along river, off X Road = use boundaries of tributaries/roads **or** 500 m, whichever is less.

Georef By: Please use your Full name: First name, Middle Initial, Last name (ie., Jennifer S. Kluse). If batching defaults to your *login name* plus the date-time stamp, we can transform it easily later in a batch. So, login name is also okay.

Georeference Sources: Enter DATE FIRST in the following format "2015-07-12", followed by semicolon and all other sources. Examples are GPS, GeoLocate, Google Earth, ACME Mapper, USGS maps, MaNIS Calculator, Frazier Method, and websites. The Batch GeoLocate defaults to "Geolocate", but add any mapping program if you tweak it, and move date to first in the list. An example is below:
"2015-04-14; GeoLocate; Google Maps; ACME Mapper; BLM Land Survey Information System"

Georeference Remarks: List how you determined the georeference. Use fixed language so that results can be searched easily. Always describe the narrowest place and the uncertainty. Additional notes canfollow uncertainty after a semicolon. Remember that uncertainty is the diameter of the circle, not the radius, unless stated. The named place is assumed to include the error unless described otherwise. Examples are as follows:
lat/long = center of Gonzales; uncertainty = extent of Gonzales
lat/long = Mississippi River Bridge; uncertainty = 200% length of bridge
lat/long = Gonzales, offset by road Hwy 10 at half distance to Sorrento; uncertainty = from GeoLocate
lat/long = Gonzales, offset by air; uncertainty = MaNIS calculator
lat/long = intersect Calcasieu Rd. and Hwy 10; uncertainty = width of road
lat/long = 3004 White Rd.; uncertainty = radius of half a block
lat/long = Clark Creek trailhead; uncertainty = extent of area
lat/long = midpoint of Astoria Dr.; uncertainty = distance to Greenwell St., in order to include woods
lat/long = midpoint (by air) btwn Baton Rouge and Gonzales; uncertainty = 1⁄2 distance btwn Gonzales and Baton Rouge

If you use the **Dups** function to clone locations, record: "cloned from [X institution name here]".

If you cannot Georeference at this point, record the following standardized notation in remarks. You may wish to append this information too.:
cannot georeference = dubious
cannot georeference = need paper map
cannot georeference = higher geography only
cannot georeference = inaccurate
cannot georeference = need further info
cannot georeference = no locality

Georeference Protocol: if unsure, leave blank. Otherwise reference the Quick Guide: "Guide to Best Practices for Georeferencing. Chapman & Wieczorek, 2006". Michael Yost will have a guide through the MaCC project. Many styles of georeferencing, so likely leave blank!

Georeference Verification Status:
I would leave this blank initially since it doesn't autofill in Batch GeoRef. However, you may want to use this to mark records for which you wish to return soon*. Use the following standardized notation:
verified by collector verified by land owner requires verification* not verified *
reviewed – high confidence reviewed – med confidence reviewed – low confidence
* means that records will need to be sorted out later.

Footprint (polygon): not needed at this point.

CONVERSIONS TO SAVE UNTIL THE END:
GeoRef Format = "point radius method" (this is a field in Specify, but not Symbiota)
GeoRef By = user name or transform username to full name
Description = mark "." in this field as a placeholder for records that need to be tagged for editing information on specimen label itself. Types of information include: editing wrong parish or state, changing incorrect coordinates, etc. *NOTE: This is a Legacy usage of this field. NOW we use this field to record descriptions of the specimen recorded on the label. Such as "yellow flowers; abundant in population".*
GeoRef Protocol: As this doesn't autofill, this should be added at the end to all of the records databased at this time, unless a new methodology arises, use: "Guide to Best Practices for Georeferencing. Chapman & Wieczorek, 2006". NOTE: This has been left blank since it's really not necessary with all the different georeferencing methods now used.

USEFUL WEBSITES:
https://globaltcn.utk.edu/georeferencing/
http://mapper.acme.com/
http://www.museum.tulane.edu/geolocate/
https://maps.google.com/
TRS:
http://www.esg.montana.edu/gl/trs-data.html
http://www.geocommunicator.gov/blmMap/MapLSIS.jsp
http://nationalmap.gov/small_scale/a_plss.html
http://www.blm.gov/cadastral/meridians/pmmap.jpg
http://www.earthpoint.us/TownshipsLouisianaOriginal.aspx
For Canada: http://www.ags.gov.ab.ca/gis/map_converters/ats_degrees_converter.html For Canada: http://legallandconverter.com/
UTM:
http://www.dmap.co.uk/utmworld.htm http://home.hiwaay.net/~taylorc/toolbox/geography/geoutm.html
For Canada: http://leware.net/geo/utmgoogleapp.htm
Georef guides:
http://manisnet.org/GeorefGuide.html
Additional Sources:
http://www.geonames.org/ http://wikimapia.org/#lang=en&lat=40.849900&lon=-73.876900&z=12&m=b http://www.fallingrain.com/world/index.html
http://www.getty.edu/research/tools/vocabularies/tgn/index.html http://mapcarta.com/
http://travelingluck.com/index.html
http://www.statoids.com/
http://geonames.usgs.gov/apex/f?p=136:1:0:::::: http://www.dmap.co.uk/utmworld.htm
http://www.rcn.montana.edu/Resources/Converter.aspx

NOTES ON GEOREFERENCING SOURCES:
GeoLocate
• Simple to use because it is directly linked to the Symbiota database via each individual record and in "batch georeferencing" mode.
• Does not necessarily place the lat/long in the center of a municipality but for several reasons (easy replication, efficiency, etc.) this is fine.

• Best used with populated places and sometimes bodies of water.
• Calculates coordinates and uncertainty.
• Does not always interpret the locality string correctly so be sure to check the parse pattern before accepting the coordinates and uncertainty.
• This tool is not yet helpful when georeferencing localities outside the U.S.

Google Maps

• Can be used for a wide range of localities.
• Easy to measure distances by road as well as extents of named places.
• Great resource for road names (ACME Mapper does not always include road names, only #s, like Hwy 41).
• Contains many features not found elsewhere (monuments, city parks, etc.) and typically includes boundaries (in "Map" view).
• Can easily locate street addresses.
• When using Google Maps to find both coordinates and uncertainty, it is most efficient to work in the following order: 1. search for the place, 2. measure the extent (from the center to the furthest point within the place), 3. place a point at the center and transfer the coordinates to the database. If you capture the coordinates first, Google Maps will automatically zoom in and remove the bounding box for the named place (which you need for measuring the extent).
• For detailed localities (road junctions, small bodies of water, etc.) be sure to zoom in and place the lat/long in the center of the feature.
• Can be used to search and map boundaries of counties.

ACME Mapper

• The 'Topo' layer is very useful, especially in remote areas.
• Sometimes includes features like trails, points, bluffs, valleys, small creeks, etc.
• Includes county boundaries as well as section boundaries (useful when township, range, section is given).
• Can measure extents using the 'Mark' tool. (Note: the 'current location' is always where the crosshairs are (at the center of the screen), whether there is a pin there or not, so be sure to record the extent before moving the map.

Bureau of Land Management (BLM) Land Survey Information System

• Especially useful in conjunction with ACME Mapper for township, range, section localities within Louisiana.
• Provides a "big picture" view of all of the townships, making it easier to find them in ACME Mapper.

The Nature Conservancy (TNC) Louisiana State Preserves Map

File name: lafo preserves state map (jpeg)
• Contains a reference map and list of TNC preserves within Louisiana.
• For general reference only. See TNC Preserves KMZ file. **Maps of TNC Preserves** (KMZ file)
• Google Earth layer with boundaries of TNC Preserves within Louisiana.
• You can click on an individual preserve to obtain the coordinates and additional information.
• Can easily measure the extent of a preserve using the given boundaries.

LSU Research Stations (Excel file)

• Contains coordinates, uncertainty, sources, datum, & georeference remarks for all LSU Research Stations.
• Can simply copy and paste from worksheet to database.

NOTES ON GEOREFERENCING PROTOCOL

The LSU Herbarium generally follows the "Guide to Best Practices for Georeferencing" with a few exceptions, listed below:

• We do not use the MaNIS Georeferencing Calculator because it is no longer supported in the latest version of Java.

• For **Features**/ **Named Places**, the extent is the uncertainty (ex: lat/long = center of Baton Rouge; uncertainty = extent of Baton Rouge).

• **Frazier Method**: When calculating the uncertainty of a locality that includes an offset distance (ex: 15 mi. N of Denham Springs), add the extent of the named place and 15% of the offset distance. Be sure to convert values into meters.

Example: 15 mi. N of Denham Springs

Extent of Denham Springs = 3470 m; Offset distance = 15 mi. = 24140.2 m Uncertainty = 3470 m + (.15 x 24140.2 m) Uncertainty = 7091 m

Georef remarks: lat/long = 15 mi. (by air) N of Denham Springs; uncertainty = extent of Denham Springs + Frazier Method

• When **no offset distance** is given (ex: N of Independence), first find the nearest named place in the direction given (in this case, Amite City) and measure (by air, unless otherwise noted) the distance between them (center to center). [Note: The nearest place should be a decent size; use your best judgment here.] Then, find the midpoint between the two places and record the coordinates as the lat/long. To find the uncertainty, measure 1⁄2 the distance between the two places. The uncertainty overlaps with each of the towns but it is better to overestimate than underestimate since the locality description is vague.

- Georef remarks: lat/long = midpoint between Independence and nearest place to the N (Amite City); uncertainty = 1⁄2 distance between Independence & Amite City

• **Township, Range, Section (TRS)** localities: In **Louisiana**, the sections are not uniform in size or shape, and there are often more than the usual 36 sections in each township. Because of this, TRS localities in Louisiana are not easily converted into lat/long, and the uncertainty is not the same for each. Also, Louisiana has two principal meridians, meaning there can be more than one of the same TRS description within the state, so make sure you are working in the correct area of the state. For further reading: http://nationalmap.gov/small_scale/a_plss.html

- Use the BLM Land Survey Information System map to locate the township/range. Zoom in to find the section and place the section in the center of the screen. Click the lat/long pin tool to get approx. coordinates. Then, transfer these coordinates to ACME Mapper.
- In ACME Mapper, you can see more detail within the section and measure the extent. If the TRS information is the most specific part of the locality description, mark the center of the section to determine the lat/long. Then mark the most distant corner of the section. Click 'Markers' to find the distance between the two marks. This is the extent of the section and also the uncertainty. Be careful not to move the map before recording the distance. The measurements given are from the markers to the 'current location', which is always where the crosshairs are, whether there is a pin there or not. If there is more specific locality information in the description (NW 1⁄4 of section; along Sandy Creek, etc.), adjust the lat/long and narrow the uncertainty accordingly.
- Using maps within Symbiota, use the topo layer to locate the TRS and calculate point radius.