

Georeferencing Protocol
Robert K. Godfrey Herbarium
Florida State University

Introduction

Virtually all specimens in the Robert K. Godfrey Herbarium contain important geographic information, ranging from the names of places and special geographic units, to roads, ordinal directions, counties, states, countries, and sometimes the latitude and longitude associated with the point of collection. Some of these label data, such as a pair of latitude/longitude coordinates, are precise; other data are more general. When available, these data allow herbarium users to derive a sense of where a specimen originated as well as provide important information about a species' geographic and ecological ranges. Unfortunately, much of this valuable label data is not currently recorded in the herbarium database in a way that allows precise and efficient mapping. Most specimen records are georeferenced to the centroid of the county in which the specimen was collected. While useful for producing county dot maps, county centroids are usually far less precise than can be determined by the locality description depicted in the data recorded on the specimen's label. The challenge is converting these textual locality descriptions into points on a map, a process which computers alone can only approximate. The collaborative georeferencing effort at the Robert K. Godfrey Herbarium is designed to improve georeferencing accuracy by combining these textual descriptions with the expertise of interested volunteers and custom online mapping tools to build finer resolution maps of the herbarium's collection.

Previous efforts at the Robert K. Godfrey Herbarium have focused on augmenting database records with geographic centroids of counties, sections, and special geographic units. All but about 1,000 records have been georeferenced this way. The next phase is to enhance the precision of our latitude/longitude pairs through the use of human reasoning in concert with a set of online georeferencing tools. By using interested volunteers, we hope to more precisely georeference our Florida specimens while at the same time returning benefit to our collaborative georeferencing participants.

Volunteers use GeoLocate, a web-based collaborative tool, to increase the precision of the latitude/longitude coordinates assigned to each specimen record. Each volunteer is provided with login credentials to the Godfrey Herbarium website, the GeoLocate collaborative website, and the GeoLocate administrative website. Each volunteer is provided one or more datasets, which will be available on an online spreadsheet. Links to these websites are provided below:

FSU Herbarium: <http://herbarium.bio.fsu.edu>

GeoLocate mapping tool: <http://www.museum.tulane.edu/geolocate/web/webcomgeoref.aspx>

Geolocate administrative site: <http://www.museum.tulane.edu/coge/>

To obtain passwords and datasets, contact Gil Nelson (gnelson@bio.fsu.edu). Following this request, you will receive an e-mail invitation to become a user of GeoLocate. Respond as directed in the e-mail. If you already have a GeoLocate account, you will merely login to be automatically added to your dataset user group. If you have not created a GeoLocate account, you will be instructed to create an account, after which you will be automatically added to your dataset user group.

Protocol

NOTE: This protocol is draft. Please help me improve it. When you begin a georeferencing session, please open a 2nd Word doc and record comments about the protocol, web tools, specimen data layout, or anything else that you think confusing or that would improve the process. Also, please insert in red below any clarifying statements or comments that will make this document stronger, easier to follow, or more effective.

The following link provides additional information about using GeoLocate:

<http://www.museum.tulane.edu/geolocate/default.html>. Review this page and the available video before following the steps below.

Overview: step by step workflow (details below)

- 1) Login to the FSU herbarium website (<http://herbarium.bio.fsu.edu>).
- 2) In a separate tab or window, login to GeoLocate (<http://www.museum.tulane.edu/geolocate/web/webcomgeoref.aspx>).
- 3) In the “Available communities” pane, select your dataset.
- 4) Click Continue.
- 5) To begin processing records, click Next Record(s).
- 6) Click Next Record(s).
- 7) Use the map layers as necessary to find the correct spot for the site description.
- 8) Measure as necessary.
- 9) If the record cannot be georeferenced, enter the reason in Add Comment; click Skip Selected.
- 10) If the record was successfully georeferenced, edit the uncertainty radius.
- 11) Add comment to record.
- 12) Click Correct.

How to begin processing records

In the Community window, you will be presented with a locality description of the record to be georeferenced. If the description includes enough information for GeoLocate to find an approximate location, a green dot will appear on the screen. If the screen is zoomed out, you may see a green dot off the coast of Africa. This means that GeoLocate could not find enough information to ascertain a locality and placed the dot at latitude/longitude coordinates 0,0. If you are zoomed in, you may not see a green dot at all. In either of these cases, zoom into the map to the approximate location indicated by the locality string. Depending on how well you know the region, it might be helpful to locate highways, roads, etc. by using the Florida Atlas and Gazetteer, a United States Forest Service map (if in the Apalachicola National Forest), or a Florida road map. Alternately, you can explore the online map by zooming in, panning around the map, and loading other map layers before (or after) clicking Next Record(s). Once a green dot is marked on the screen, you will see the Calculated Coordinates and radius of uncertainty (U. Radius) in the bottom right of the screen. These coordinates will change as you move the marker.

Clicking once on the green dot will expand a bubble that includes the currently calculated values for longitude and latitude, the uncertainty in meters, and a link to allow editing the uncertainty value. Clicking Edit uncertainty will place an arrow on the screen at the margin of the circle of uncertainty. Drag this arrow to make the circle larger or smaller. As the circle expands or contracts, the U. Radius value at the bottom right of the screen will change accordingly. Once you are comfortable with your uncertainty assessment, click the green dot again to fix the circle's diameter. The arrow will disappear. Adjusting uncertainty can be repeated as many times as desired prior to saving the record.

Viewing the source record

You can view the source record from the FSU herbarium website by clicking on the + to the left of the locality string. The record will expand and the + will change to a -. This will expose the record number and the species name associated with the specimen being georeferenced. The record number preceding the species name is a hyperlink. Clicking it will take you to the FSU website and display the original record as well as an image of the specimen sheet, if one is available. For records that are listed as endangered or threatened, or that belong to one of the carnivorous plant families, you must be logged in to the FSU database to see the record's complete data. Clicking View Image below a thumbnail will open a viewer and allow close inspection of the specimen and its label data. Viewing the specimen record is not required for completing the georeferencing activity, but sometimes reveals information not available in the locality string, including the collection date and collector's name and any information included on an annotation label.

Loading map layers

GeoLocate includes several helpful map layers. To access and load these layers, click on the + near the top, right-hand side of the map window. Experiment by selecting varying map layers. Some are better for roads, some for terrain, some for habitat, others for geographic features like rivers and lakes. Google Streets is especially useful for national forest road numbers, which appear in many locality strings. Don't forget to try different layers with each locality as you georeference. Sometimes exploring several layers is required. To temporarily hide the list of layers, click the – sign at the top right of the layer list.

Expanding the screen

The square at the extreme top right of the map window allows you to expand the screen to the full monitor. This can be helpful when zoomed-in close or when attempting to measure distance. You will note that the locality string is hidden when the map is zoomed-in. Click the same square to return the screen to normal.

Zooming and panning

The icons at the top left of the map window allow you to pan (up, down, right, left) or zoom in or out. You can accomplish the same functionality by using the mouse. Clicking and holding the left mouse button allows panning. The mouse wheel allows zooming.

Marking a spot

To mark a spot on the map, click "Place marker" at the right side of the pane below the map, then click on the screen at the point you want to place the marker. A green dot will appear, along

with a balloon showing the latitude and longitude of this spot. To move the mark, close the balloon, position the mouse pointer over the dot, depress the left mouse button, and drag the dot to its new location. This marking and dragging process will be your chief method for arriving at a georeferenced point.

Defining the uncertainty radius

Once you are confident that your location is as close as you can mark it, please edit your uncertainty by clicking “Edit uncertainty” in the balloon generated above your mark. Drag the arrow that appears to enlarge or reduce the circle surround the mark, noting the measured distance of your uncertainly radius.

Defining a polygon

For some points, especially for specimens collected occur along roads, rivers, and other linear features, a polygon might express the uncertainty better than a radius. For such points, record both the uncertainty radius and a polygon.

Measuring

Many locality descriptions will include cardinal directions and distances, as “2.2 m ESE of jet SR 267 and SR 20,” which can be interpreted to mean 2.2 miles east–southeast of the point where SR 267 diverges from SR 20. You can use the green dot and the measuring tool to mark a more exact location. To measure the distance between two points, select “Measure distance” in the pane below and to the right of the map window. The cursor will now display a white square. Please the square at the origin of the measurement and click the left mouse button and release it. Move the cursor to the ending point, or for the desired distance. The measured distance is shown below the “Place marker” option in the pane below and to the right of the map window. At the appropriate distance, double click the mouse to stop measuring. You can then move the green dot to this new location.

Comments

Once you are confident that the green dot is positioned in a location matching the spot referenced in the locality description, you may want to add a comment regarding your confidence in the point or atypical processes for arriving at your point. To do this, click Add Comments.

Skipping records

If you feel you do not have enough information to georeference a given locality, click Skip Selected and enter the reason you cannot perform an adequate georeference.

Saving points

Once you have recorded your mark and entered your comment, click Correct to save the mark. Please note that once Correct has been clicked, you will not be able to go back to this record.

Completing a session

To complete a session, logoff without clicking Next Record(s) or Correct. No changes to the currently displayed record will be saved.