GEOREFERENCING

TOOLS AND PRACTICES

Gil Nelson
Digitizing Dried Insects
Field Museum
25 April 2013

iDigBio
Integrated Digitized Biocollections

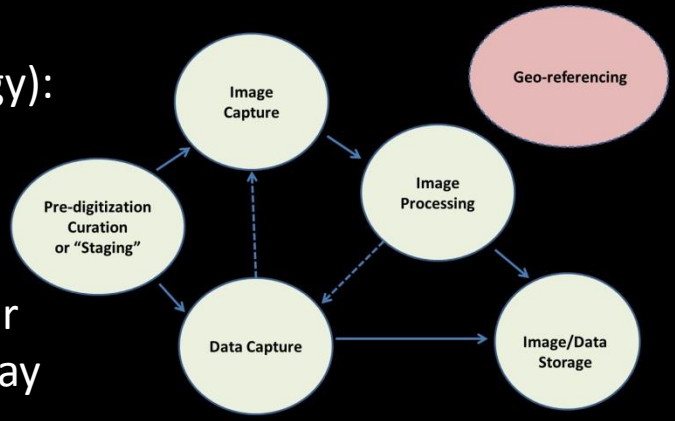
Where does georeferencing fit into the digitization workflow?

- Traditional approach: As complete records are entered, all data, including georeferences are determined and entered.

- Proactive approach: Due to the prevalence of GPS devices, many modern collectors include georeferencing data which can be entered/uploaded at the time a specimen is initially cataloged. Each collecting locality gets named, georeferenced, and entered. Collections at that locality are all linked to the same event and are “automatically” georeferenced as they are entered/uploaded.

Where does georeferencing fit into the digitization workflow?

- Newer approach for legacy data (especially for entomology): Georeferencing becomes an activity focused on collecting events and their localities and precedes specimen/tray-based data entry. This allows records with identical or similar localities to be parsed and pooled by technicians or software that assign georeferences in bulk. Subsequent tray or specimen records are linked to these georeferenced localities.



- In bulk or individually based on known boundaries of counties, parks, preserves, sections, towns, or other areas with a defined boundary and known extent. In these cases, georeferencing is reported accurate to the known extent. Such georeferencing can be accomplished in bulk through database queries that insert centroid data into reference tables.

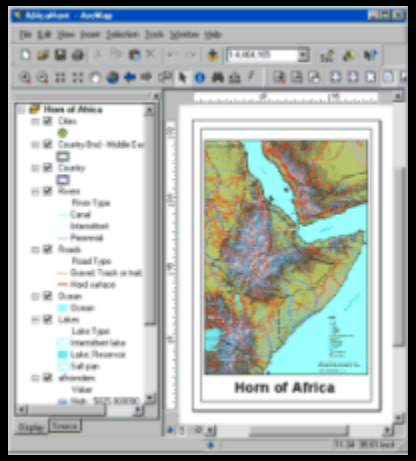
iDigBio
Integrated Digitized Biocollections

Georeferencing Data Elements

- Latitude (dd.dddd)
- Longitude (dd.dddd)
- Datum (coordinate system)
- Projection
- Precision
- Georeferencing method
- Georeferencing remarks

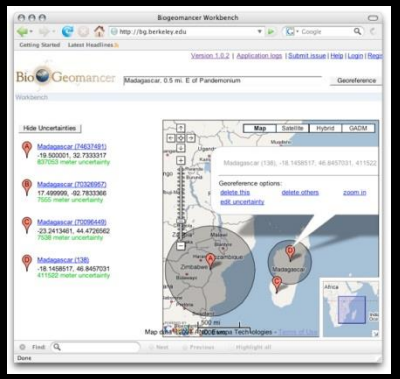
Georeferencing Methods and Tools

ArcGIS



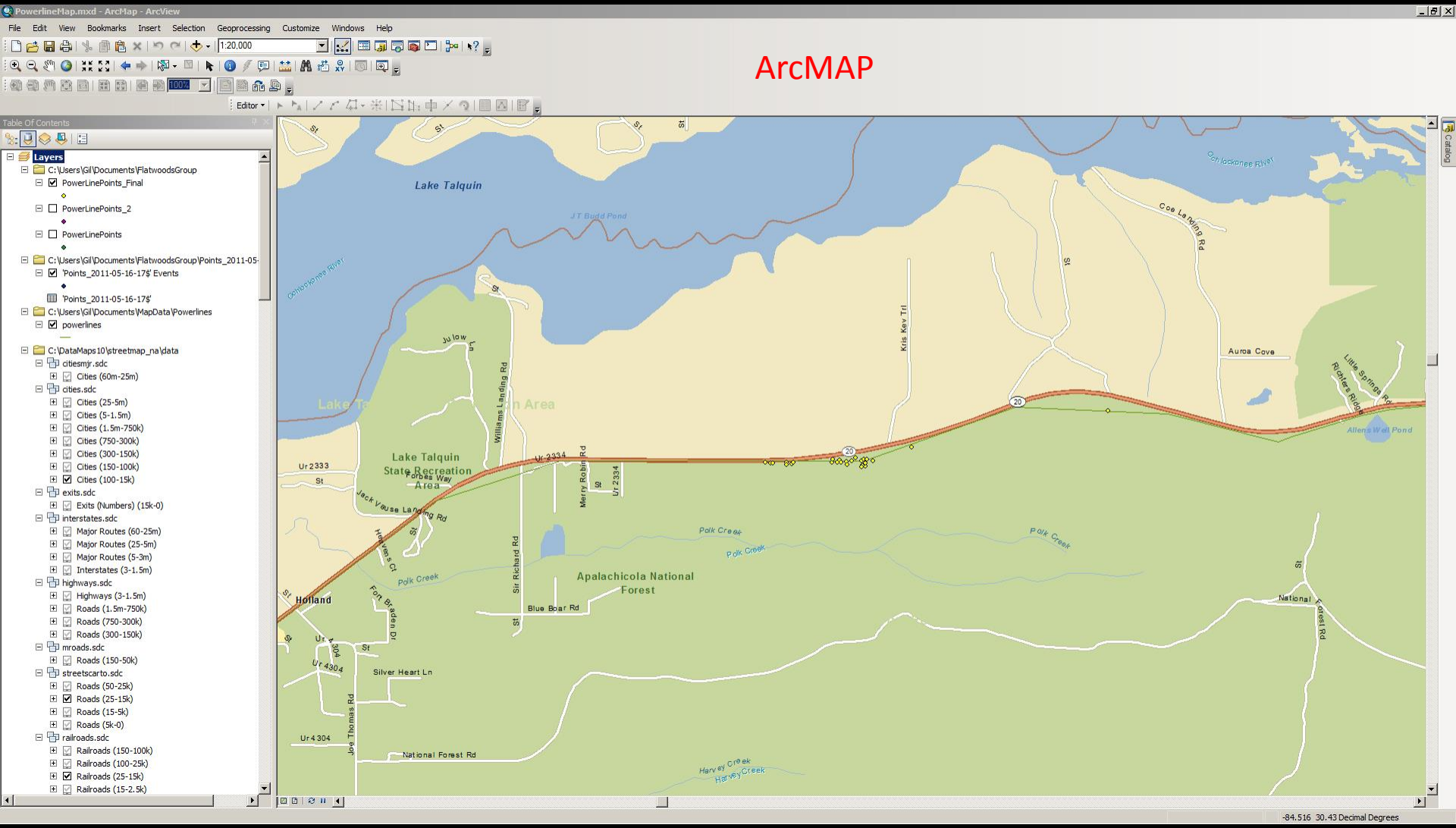
Google Earth/Maps

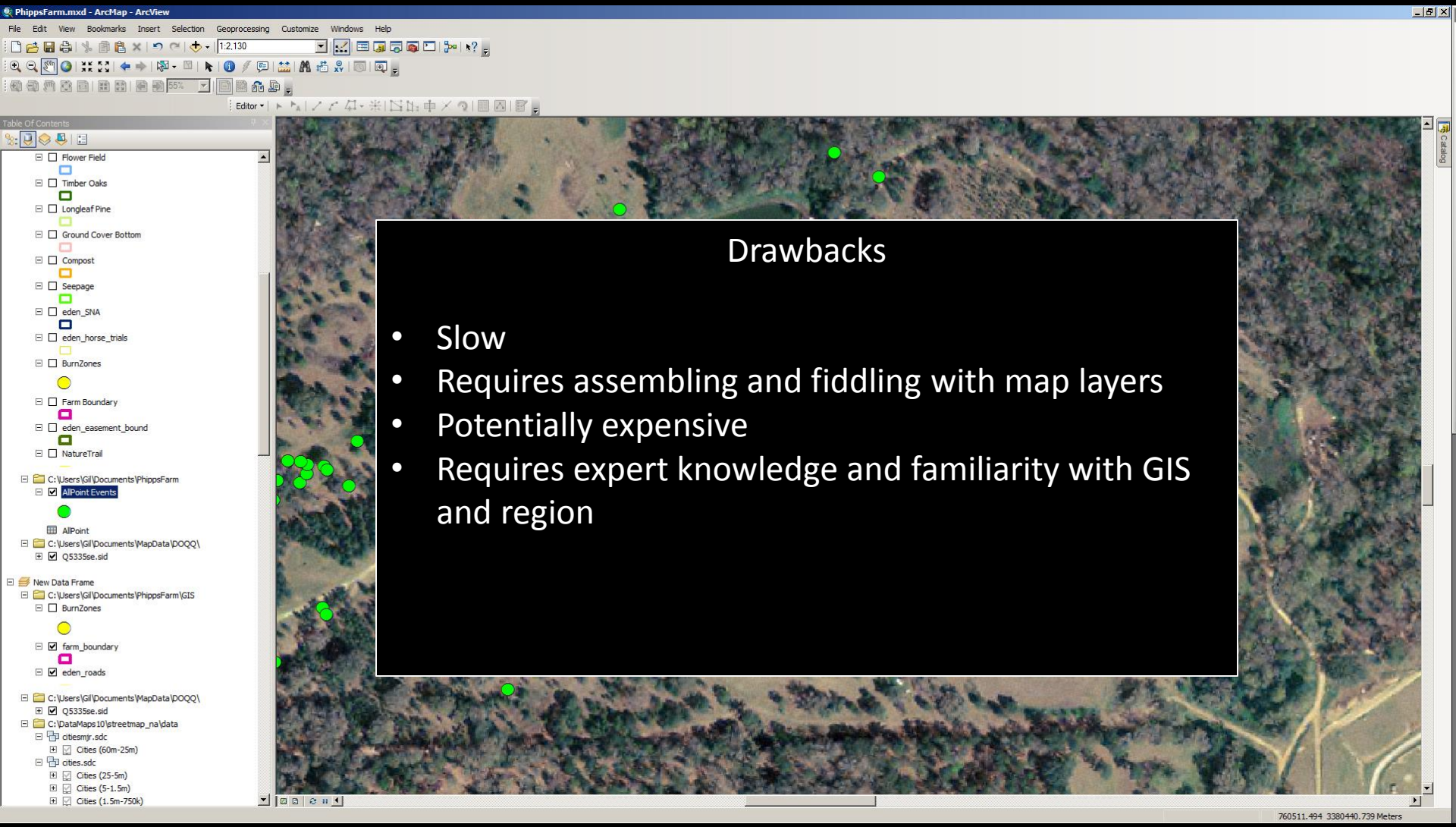
Geolocate



iDigBio
Integrated Digitized Biocollections

ArcMAP





Drawbacks

- Slow
- Requires assembling and fiddling with map layers
- Potentially expensive
- Requires expert knowledge and familiarity with GIS and region

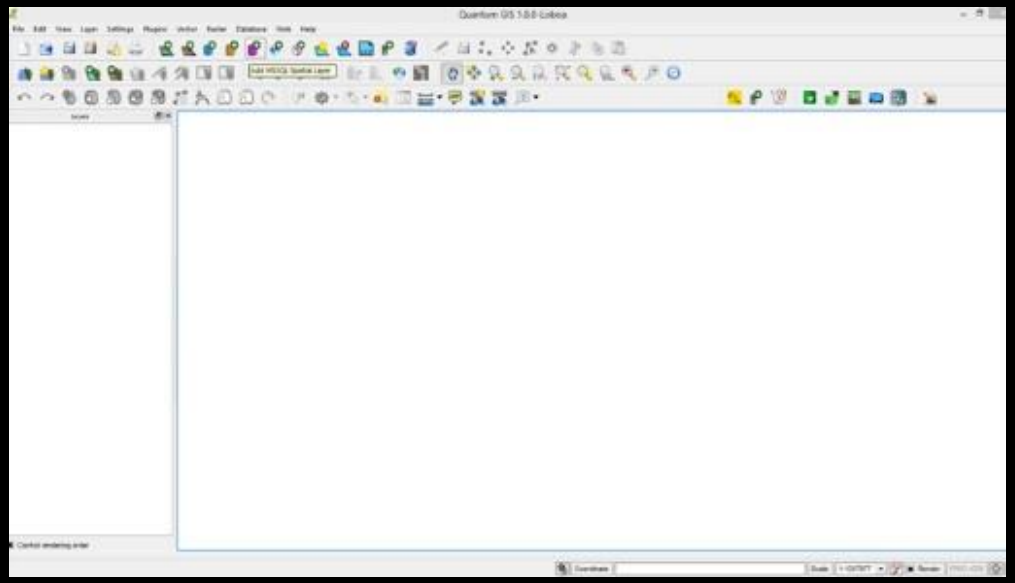
Open Source GIS

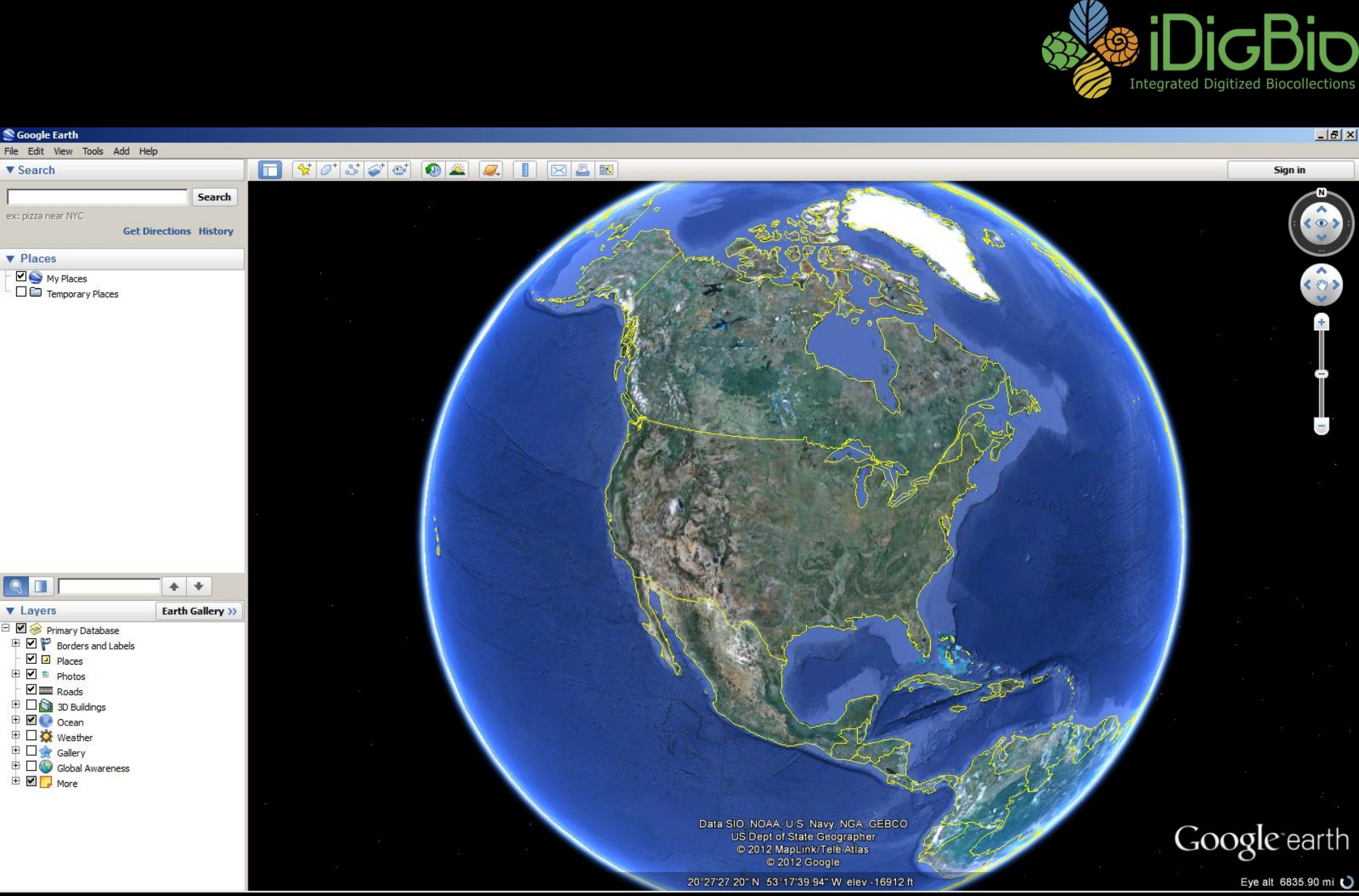
Quantum GIS

MAPWINDOW

DIVA-GIS

Free, simple & effective




iDigBio
Integrated Digitized Biocollections
Google Earth
File Edit View Tools Add Help
Search
Search
ex: pizza near NYC
Get Directions History
Places
My Places
Temporary Places
Layers
Earth Gallery
Primary Database
Borders and Labels
Places
Photos
Roads
3D Buildings
Ocean
Weather
Gallery
Global Awareness
More
Sign in
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
US Dept of State Geographer
© 2012 MapLink/Tele Atlas
© 2012 Google
20°27'27.20" N 53°17'39.94" W elev -16912 ft
Google earth
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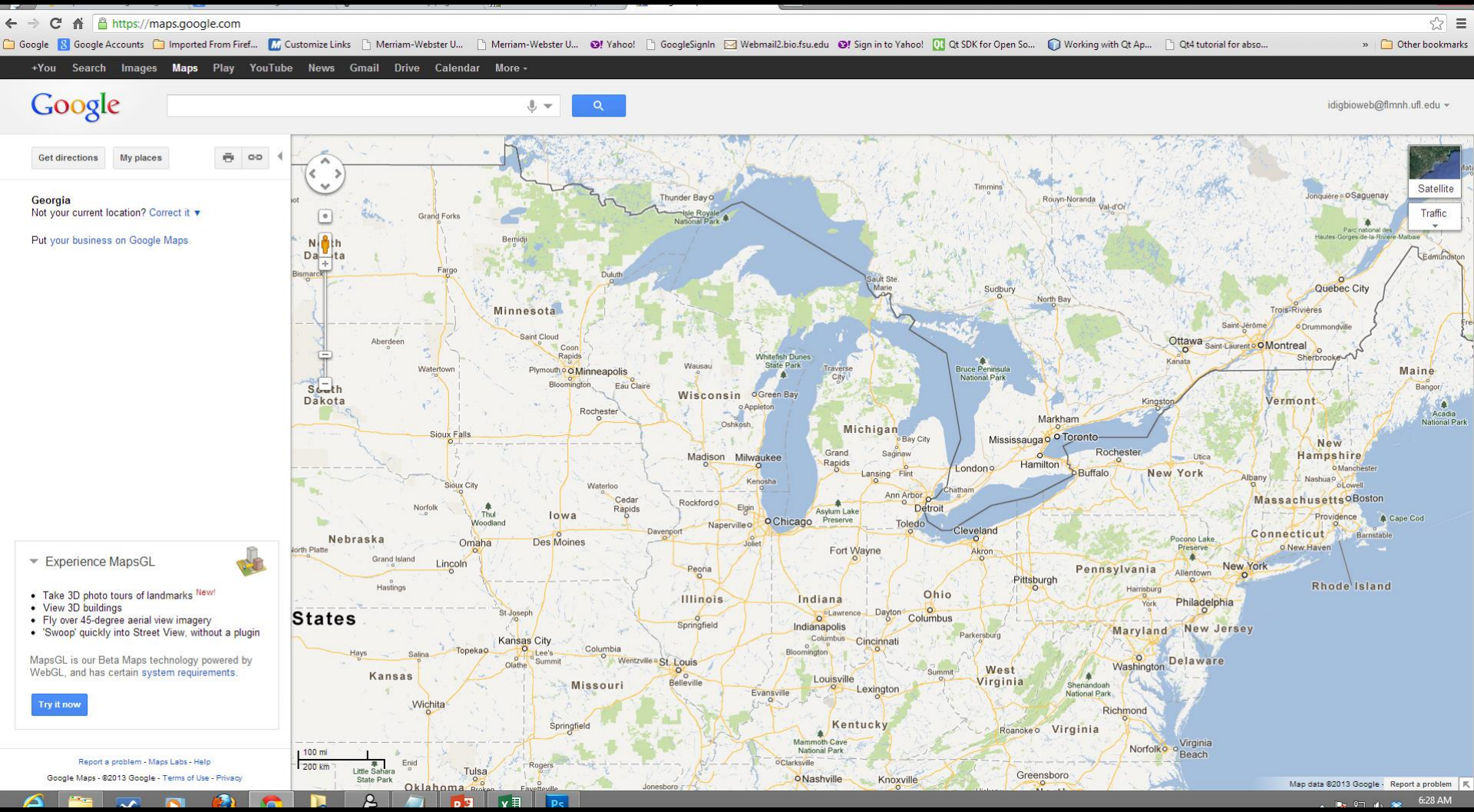
Google Maps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Google
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Imported From Firef...
Customize Links
Merriam-Webster U...
Merriam-Webster U...
Yahoo!
GoogleSignIn
Webmail2.bio.fsu.edu
Sign in to Yahoo!
Qt SDK for Open So...
Working with Qt Ap...
Qt4 tutorial for abso...
Other bookmarks
+You
Search
Images
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Play
YouTube
News
Gmail
Drive
Calendar
More
Google
idigbioweb@flmnh.ufl.edu
Get directions
My places
Georgia
Not your current location? Correct it
Put your business on Google Maps
Experience MapsGL
Take 3D photo tours of landmarks New!
View 3D buildings
Fly over 45-degree aerial view imagery
'Swoop' quickly into Street View, without a plugin
MapsGL is our Beta Maps technology powered by WebGL, and has certain system requirements.
Try it now
Report a problem - Maps Labs - Help
Google Maps - ©2013 Google - Terms of Use - Privacy
Satellite
Traffic
Minnesota
Wisconsin
Michigan
Iowa
Illinois
Indiana
Ohio
Pennsylvania
New York
Vermont
New Hampshire
Massachusetts
Connecticut
Rhode Island
Maryland
New Jersey
Delaware
Kansas
Missouri
Kentucky
West Virginia
Virginia
Nebraska
Oklahoma
Minneapolis
Chicago
Detroit
Toledo
Cleveland
Toronto
Buffalo
Hamilton
Mississauga
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Montreal
Quebec City
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Norfolk
Virginia Beach
Greensboro
Knoxville
Nashville
Louisville
Lexington
Cincinnati
Columbus
Indianapolis
Fort Wayne
Pittsburgh
Akron
Rochester
Kingston
Sudbury
Thunder Bay
Sault Ste. Marie
Green Bay
Milwaukee
Madison
Des Moines
Omaha
Lincoln
Kansas City
St. Louis
Wichita
Tulsa
Sioux Falls
Fargo
Duluth
Bismarck
Aberdeen
Watertown
Rochester
Waterloo
Cedar Rapids
Davenport
Peoria
Springfield
Columbia
Topeka
Lee's Summit
Olathe
Hays
Salina
Enid
Little Sahara State Park
Mammoth Cave National Park
Shenandoah National Park
Pocono Lake Preserve
Asylum Lake Preserve
Bruce Peninsula National Park
Isle Royale National Park
Whitefish Dunes State Park
Acadia National Park
Cape Cod
Barnstable
Providence
Manchester
Nashua
Lowell
Albany
Utica
Saint-Jérôme
Drummondville
Trois-Rivières
Saint-Laurent
Sherbrooke
Saguenay
Jonquière
Edmundston
Bangor
Timmins
Rouyn-Noranda
Val-d'Or
Sault Ste. Marie
Grand Forks
Bemidji
Saint Cloud
Coon Rapids
Plymouth
Bloomington
Eau Claire
Wausau
Appleton
Oshkosh
Traverse City
Bay City
Saginaw
Grand Rapids
Lansing
Flint
Ann Arbor
Chatham
Kenosha
Elgin
Naperville
Joliet
Lawrence
Dayton
Columbus
Bloomington
Parkersburg
Summit
Evansville
Belleville
Wentzville
Springfield
Rogers
Fayetteville
Jonesboro
Clarksville
Roanoke
Harrisburg
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Allentown
New Haven
Cape Cod
Sioux City
Norfolk
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Grand Island
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Olathe
Lee's Summit
Enid
Broken
100 mi
200 km
Map data ©2013 Google - Report a problem
6:28 AM

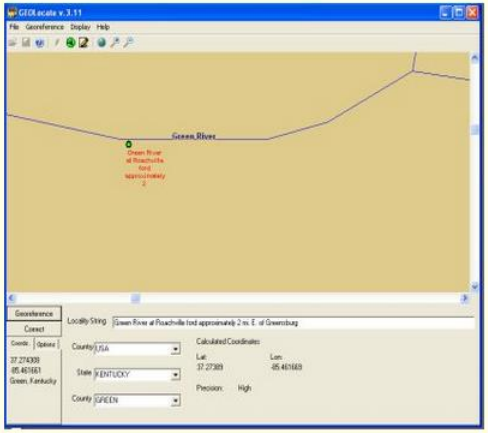
www.museum.tulane.edu/geolocate/

Collaborative Georeferencing

Home | Standalone App | Java Client | Web Application | Collaborative Georeferencing | Developer Resources | Workshops | Support and Contacts

GEOLocate

A Platform for Georeferencing Natural History Collections Data



For Users:

- Overview
- GEOLocate Web
- GEOLocate 3.xx (standalone)
  - Global Expansion
- GEOLocate 4.xx (java client)
- Collaborative Georeferencing

Video tutorial on the collaborative georeferencing web client.

Online tutorial

For Developers:

- Soap Services
- Rest Services (coming soon)
- WMS/WFS Services (coming soon)

Web Application	Web Services	Desktop Application	Java Client Application	Collaborative Georeferencing
Georeference collections data using your web browser. Quick and easy georeferencing.	Integrate georeferencing into your own databases and applications using GEOLocate webservices.	The original standalone desktop application.	Cross platform Java application. Uses web services for georeferencing	Build communities, share data, relate records across collections and improve verification efficiency.

Currently integrated with Specify and Symbiota

www.museum.tulane.edu/geolocate/community/default.html

Management portal

Collaborative Georeferencing

The goal of this project is to provide a mechanism whereby groups of users can form communities to collaboratively georeference and verify a shared dataset. This collaborative georeferencing framework consists of two end-user components:

1. A client application for reviewing and editing community records. Currently there are 2 applications available for this task:
   - The GEOLocate desktop application
   - The GEOLocate web-based collaborative client (click link to try it out)
2. Web-based data management portal for creating and managing communities, their respective users and data sources

Shared community datasets created via the portal may consist of multiple underlying data sources from either live DiGIR providers and/or uploaded text files. Support for TAPIR providers is currently under development. Data are stored using the full Darwin Core 1.2 specification, but subsets and/or alternatives schemas may be imported using the schema mapping interface. During import, data items are automatically normalized, georeferenced and related to one another via a similarity index. This index is used to identify all records that appear to describe the same collection locality regardless of syntax. During coordinate verification, users have the option to re-classify records that were incorrectly related to one another.

Verification and correction of the computer generated geographic coordinates is accomplished using the GEOLocate desktop application. GEOLocate allows users to login to their communities, retrieve and visualize results, make any necessary corrections, provide additional comments, define errors as polygons, and save the results back to the shared dataset. The verified results of georeferencing can then be downloaded via the portal's data management interface for re-import to the parent database.

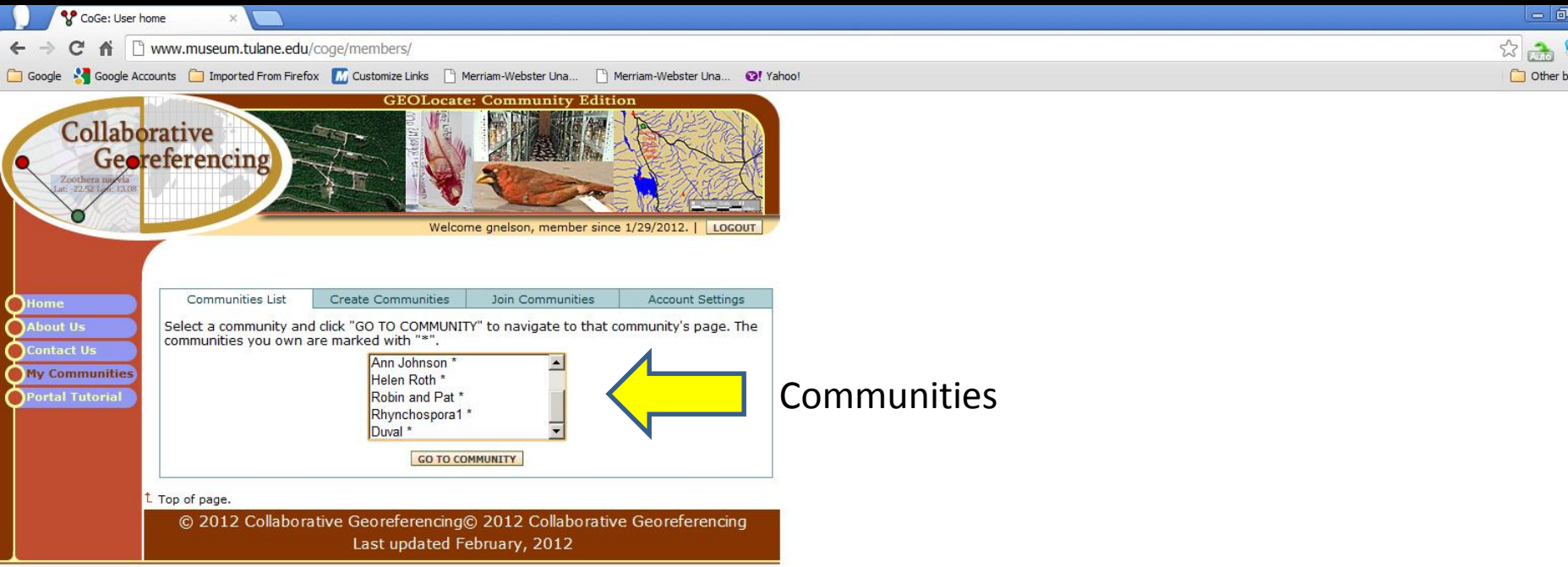
To examine the gains in efficiency over traditional georeferencing 2100 randomly selected collecting events from the TUMNH fish collection were imported and georeferenced using the collaborative georeferencing framework. The TUMNH fish collection was georeferenced by hand in the mid to late 90's and therefore provides a useful test bed for assessing the efficiency and accuracy of automated methodologies. Of the 2100 records, 30% were identified as being similar to other records and an additional 33% were duplicates leaving a total of 782 unique locations requiring correction, a 63% reduction in effort overall.

Video Tutorials

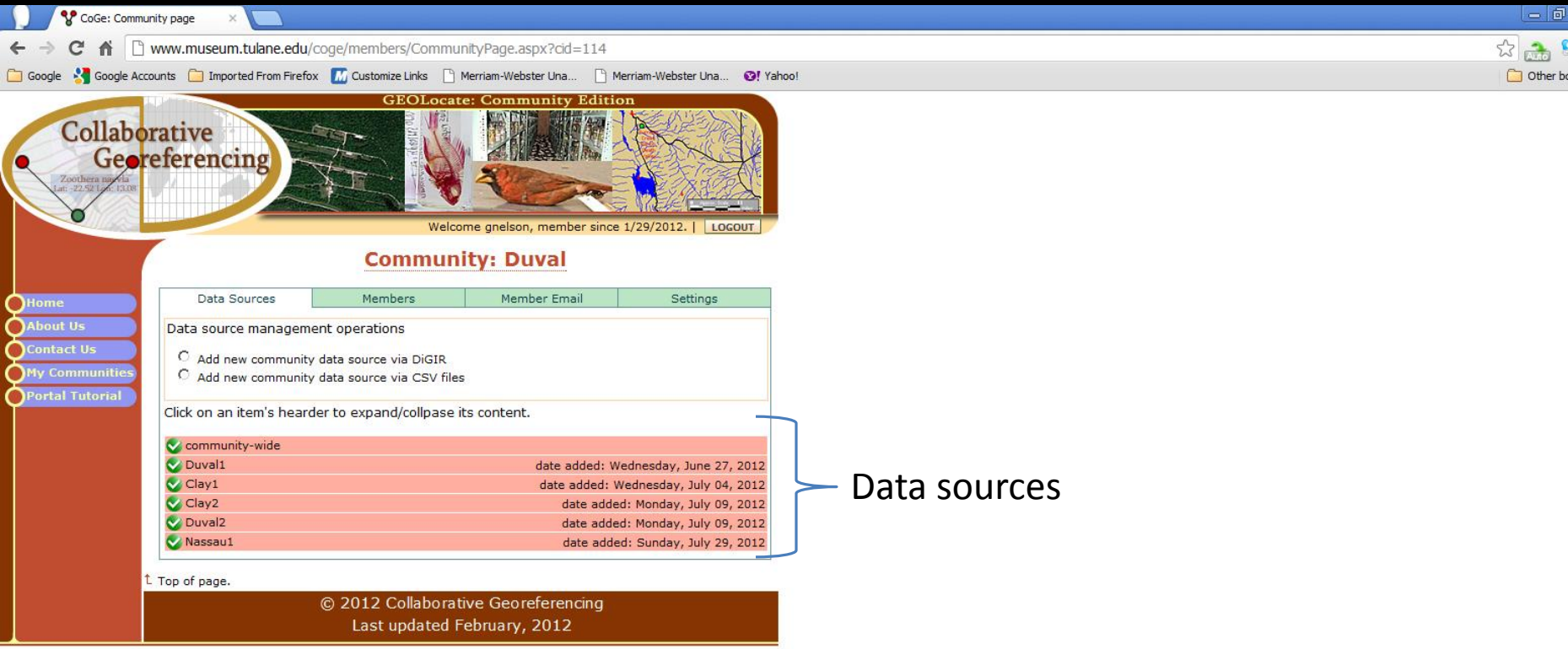
http://www.museum.tulane.edu/coge/

Sign in

Requires a free account



Communities



Data sources

CoGe: Community page

www.museum.tulane.edu/coge/members/CommunityPage.aspx?cid=114

Google | Google Accounts | Imported From Firefox | Customize Links | Merriam-Webster Una... | Merriam-Webster Una... | Yahoo! | Other bookmarks

GEOLocate: Community Edition

Collaborative Georeferencing

Welcome gnelson, member since 1/29/2012. | LOGOUT

Community: Duval

- Home
- About Us
- Contact Us
- My Communities
- Portal Tutorial

Data Sources | Members | Member Email | Settings

Data source management operations

- Add new community data source via DiGIR
- Add new community data source via CSV files

Click on an item's hearder to expand/collpase its content.

community-wide

Duval1 date added: Wednesday, June 27, 2012

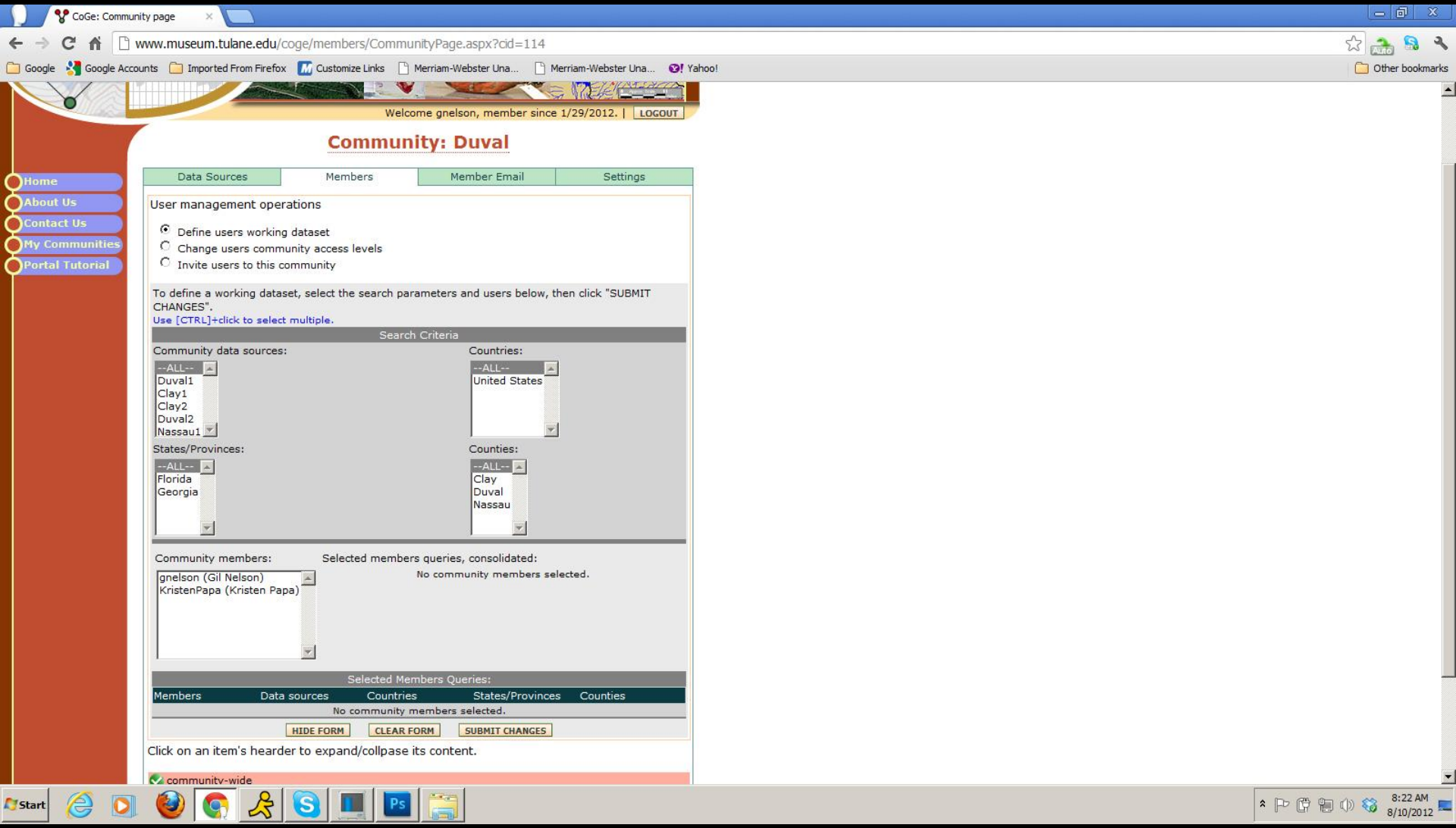
Clay1 date added: Wednesday, July 04, 2012

Secondary name:	Clay1
Path:	drive
Type:	csv
Owner:	you
Number of records:	50
Status:	cached
Task:	UPDATE CACHE VIEW CACHE
Records statistics:	VIEW CORRECTIONS

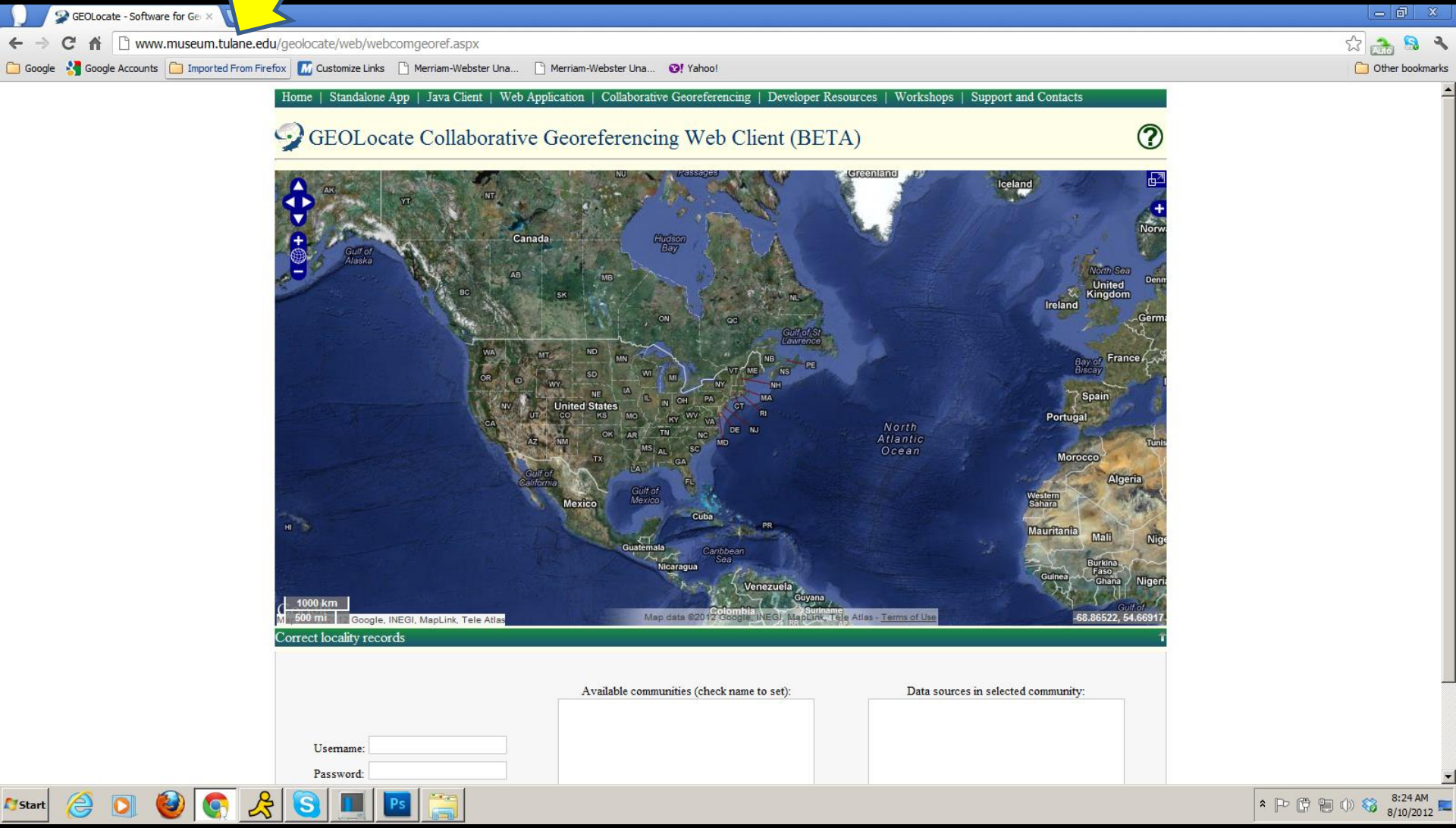
Clay2 date added: Monday, July 09, 2012

Start

8:18 AM
8/10/2012


CoGe: Community page
www.museum.tulane.edu/coge/members/CommunityPage.aspx?cid=114
Google
Google Accounts
Imported From Firefox
Customize Links
Merriam-Webster Una...
Merriam-Webster Una...
Yahoo!
Other bookmarks
Welcome gnelson, member since 1/29/2012. | LOGOUT
Community: Duval
Home
About Us
Contact Us
My Communities
Portal Tutorial
Data Sources
Members
Member Email
Settings
User management operations
Define users working dataset
Change users community access levels
Invite users to this community
To define a working dataset, select the search parameters and users below, then click "SUBMIT CHANGES".
Use [CTRL]+click to select multiple.
Search Criteria
Community data sources:
--ALL--
Duval1
Clay1
Clay2
Duval2
Nassau1
Countries:
--ALL--
United States
States/Provinces:
--ALL--
Florida
Georgia
Counties:
--ALL--
Clay
Duval
Nassau
Community members:
gnelson (Gil Nelson)
KristenPapa (Kristen Papa)
Selected members queries, consolidated:
No community members selected.
Selected Members Queries:
Members
Data sources
Countries
States/Provinces
Counties
No community members selected.
HIDE FORM
CLEAR FORM
SUBMIT CHANGES
Click on an item's hearder to expand/collpase its content.
community-wide
Start
8:22 AM
8/10/2012

www.museum.tulane.edu/geolocate/web/webcomgeoref.aspx



GEOLocate - Software for Ge

www.museum.tulane.edu/geolocate/web/webcomgeoref.aspx

Google | Google Accounts | Imported From Firefox | Customize Links | Merriam-Webster Una... | Merriam-Webster Una... | Yahoo! | Other bookmarks

1 possible location(s) found.

Correct locality records

Locality string

Community: Duval

Drawford Vicinity of Drawford. Pine flatwoods.; United States; Florida; Nassau; 30.34722; -84.98028;

527481 Scleria triglomerata

Similar Records(0)

Identical Records(0)

Next Record(s)

Correct

Skip Selected

Add Comments

Logout

Place marker Measure

Draw polygon

logged in as: gnelson

Calculated Coordinates

Lat: 30.34722

Lon: -84.98028

U. Radius: 3036 m

Manual Edit

1 possible location(s) found.

GEOLocate - Software for Ge | FSU Herbarium - Specimen De

www.museum.tulane.edu/geolocate/web/webcomgeoref.aspx

Google | Google Accounts | Imported From Firefox | Customize Links | Merriam-Webster Una... | Merriam-Webster Una... | Yahoo! | Other bookmarks

1 possible location(s) found.

Correct locality records

Next Record(s)
Correct
Skip Selected
Add Comments
Logout

Community: Duval

Drawford Vicinity of Drawford. Pine flatwoods.; United States; Florida; Nassau; 30.34722; -84.98028;

527481 Scleria triglomerata

Similar Records(0)

Identical Records(0)

Place marker | Measure | Draw polygon

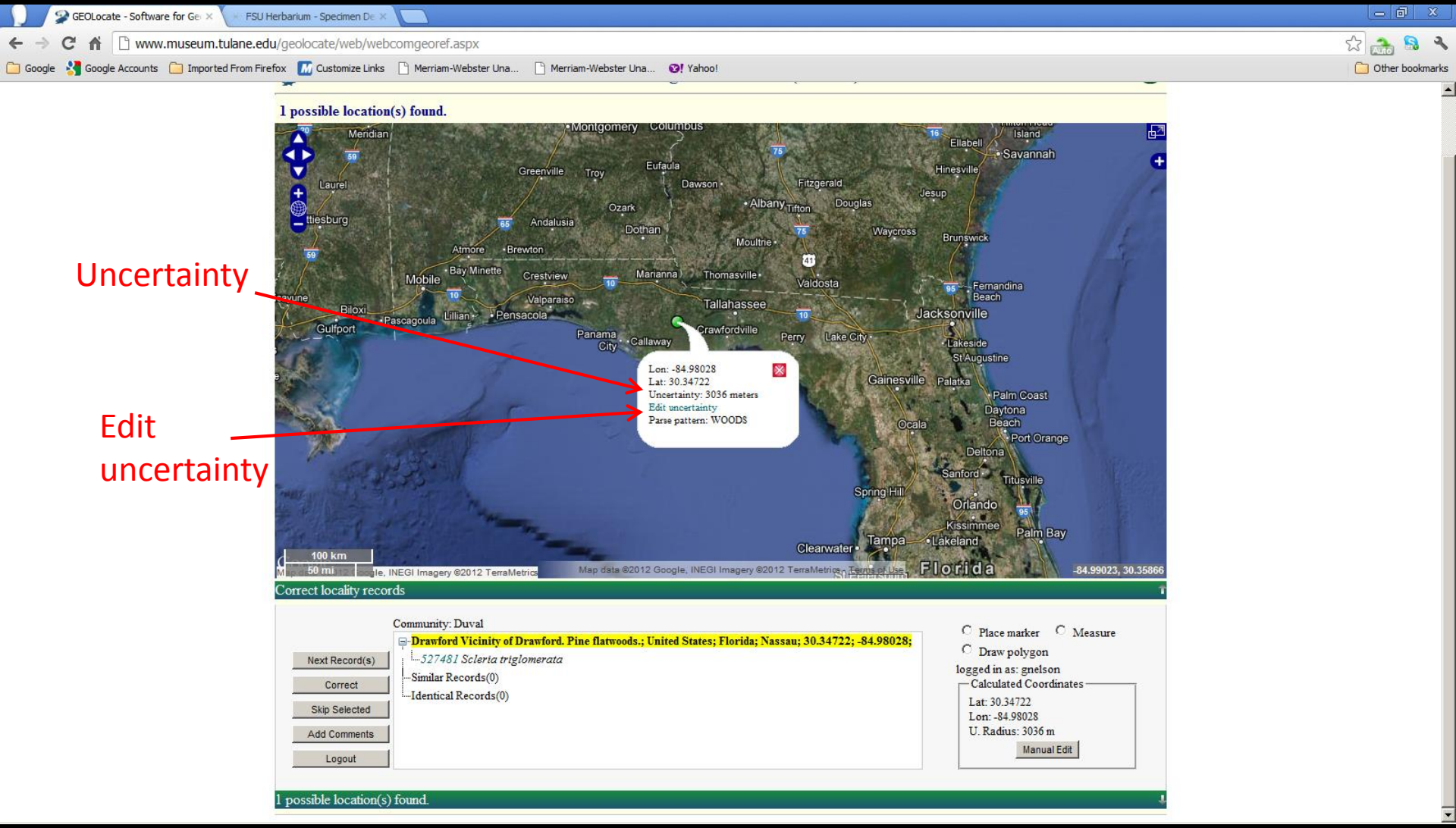
logged in as: gnelson

Calculated Coordinates

Lat: 30.34722
Lon: -84.98028
U. Radius: 3036 m

Manual Edit

1 possible location(s) found.


GEOLocate - Software for Ge
FSU Herbarium - Specimen De
www.museum.tulane.edu/geolocate/web/webcomgeoref.aspx
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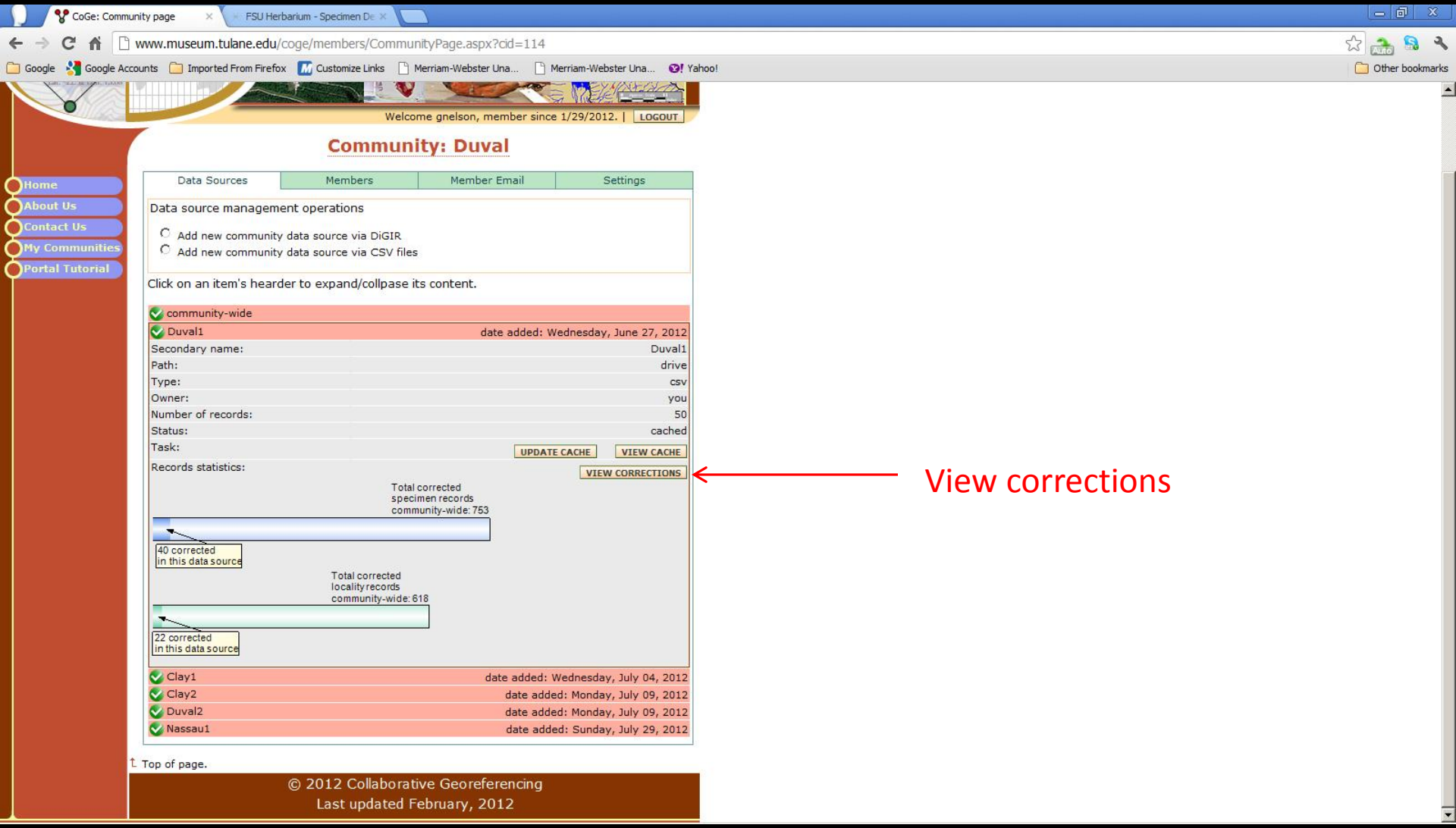
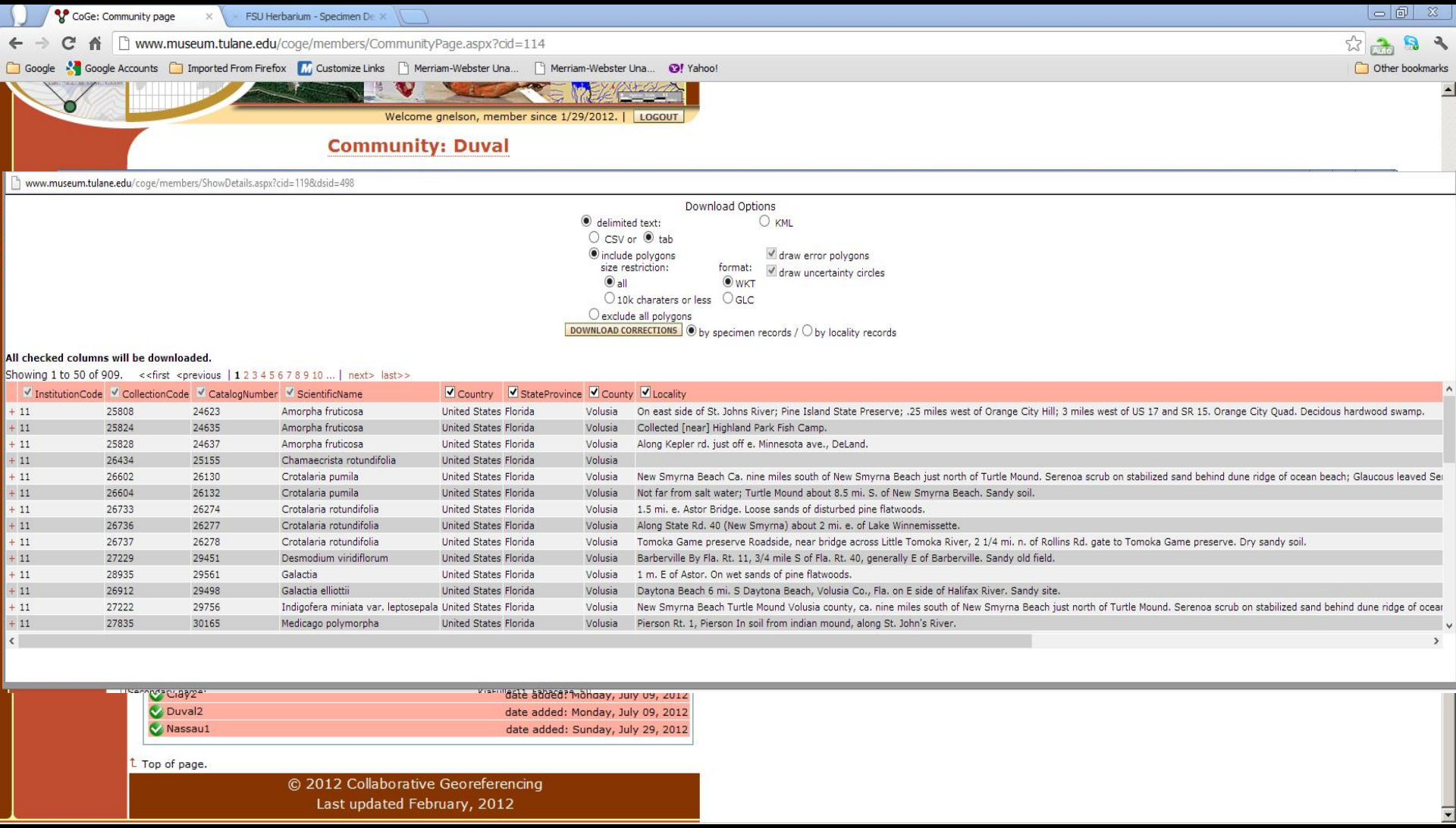
Merriam-Webster Una...
Yahoo!
Other bookmarks
1 possible location(s) found.
Uncertainty
Edit uncertainty
Lon: -84.98028
Lat: 30.34722
Uncertainty: 3036 meters
Edit uncertainty
Parse pattern: WOODS
Correct locality records
Community: Duval
Drawford Vicinity of Drawford. Pine flatwoods.; United States; Florida; Nassau; 30.34722; -84.98028;
527481 Scleria triglomerata
Similar Records(0)
Identical Records(0)
Next Record(s)
Correct
Skip Selected
Add Comments
Logout
Place marker
Measure
Draw polygon
logged in as: gnelson
Calculated Coordinates
Lat: 30.34722
Lon: -84.98028
U. Radius: 3036 m
Manual Edit
1 possible location(s) found.
Florida
-84.99023, 30.35866



View corrections


CoGe: Community page
FSU Herbarium - Specimen De
www.museum.tulane.edu/coge/members/CommunityPage.aspx?cid=114
Google
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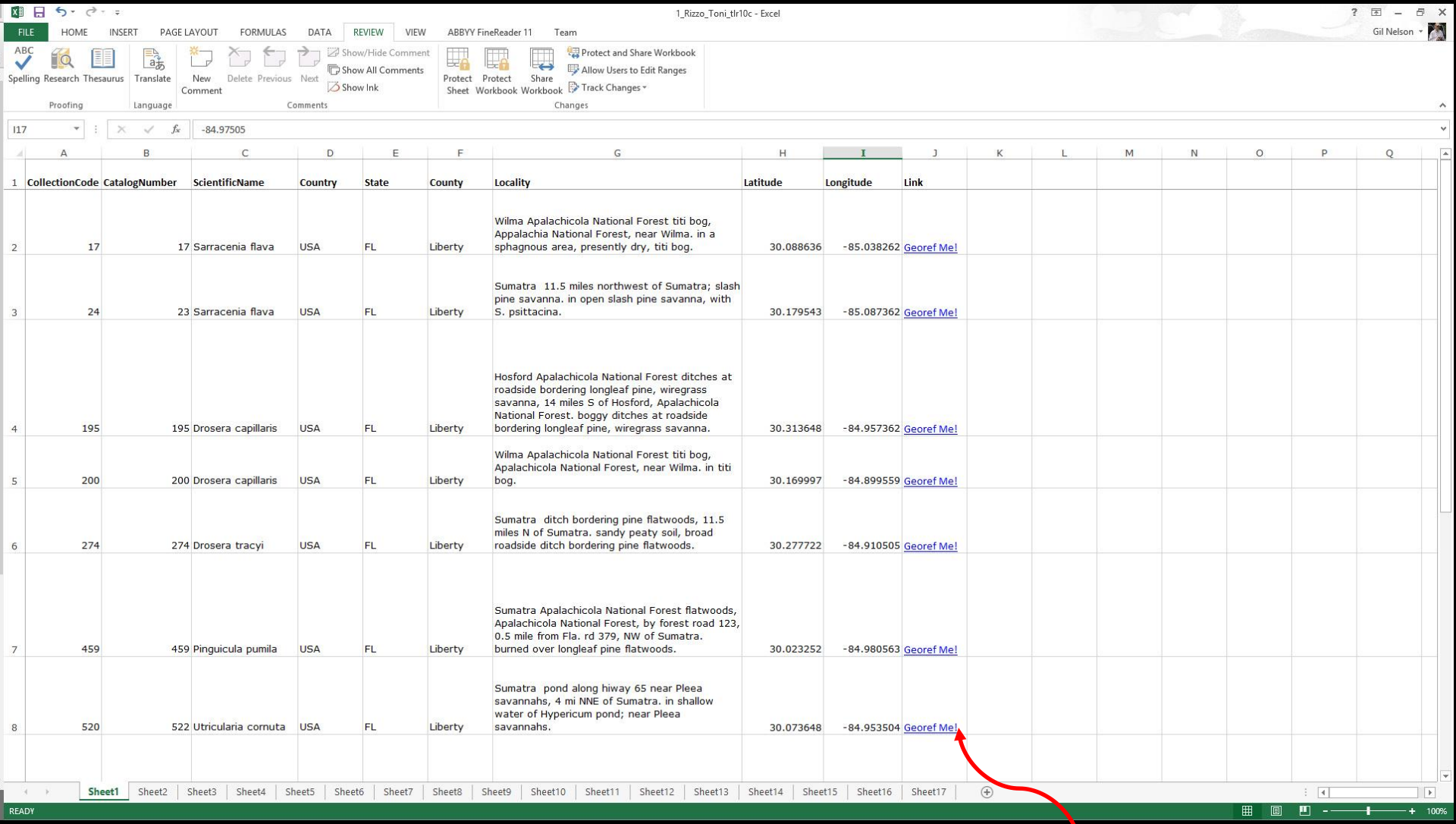
Merriam-Webster Una...
Yahoo!
Other bookmarks
Welcome gnelson, member since 1/29/2012. | LOGOUT
Community: Duval
www.museum.tulane.edu/coge/members/ShowDetails.aspx?cid=119&dsid=498
Download Options
delimited text:
KML
CSV or
tab
include polygons
size restriction:
format:
draw error polygons
draw uncertainty circles
all
WKT
10k charaters or less
GLC
exclude all polygons
DOWNLOAD CORRECTIONS
by specimen records /
by locality records
All checked columns will be downloaded.
Showing 1 to 50 of 909. <<first <previous | 1 2 3 4 5 6 7 8 9 10 ... | next> last>>
InstitutionCode
CollectionCode
CatalogNumber
ScientificName
Country
StateProvince
County
Locality
+ 11 25808 24623 Amorpha fruticosa United States Florida Volusia On east side of St. Johns River; Pine Island State Preserve; .25 miles west of Orange City Hill; 3 miles west of US 17 and SR 15. Orange City Quad. Decidous hardwood swamp.
+ 11 25824 24635 Amorpha fruticosa United States Florida Volusia Collected [near] Highland Park Fish Camp.
+ 11 25828 24637 Amorpha fruticosa United States Florida Volusia Along Kepler rd. just off e. Minnesota ave., DeLand.
+ 11 26434 25155 Chamaecrista rotundifolia United States Florida Volusia
+ 11 26602 26130 Crotalaria pumila United States Florida Volusia New Smyrna Beach Ca. nine miles south of New Smyrna Beach just north of Turtle Mound. Serenoa scrub on stabilized sand behind dune ridge of ocean beach; Glaucous leaved Se
+ 11 26604 26132 Crotalaria pumila United States Florida Volusia Not far from salt water; Turtle Mound about 8.5 mi. S. of New Smyrna Beach. Sandy soil.
+ 11 26733 26274 Crotalaria rotundifolia United States Florida Volusia 1.5 mi. e. Astor Bridge. Loose sands of disturbed pine flatwoods.
+ 11 26736 26277 Crotalaria rotundifolia United States Florida Volusia Along State Rd. 40 (New Smyrna) about 2 mi. e. of Lake Winnemissette.
+ 11 26737 26278 Crotalaria rotundifolia United States Florida Volusia Tomoka Game preserve Roadside, near bridge across Little Tomoka River, 2 1/4 mi. n. of Rollins Rd. gate to Tomoka Game preserve. Dry sandy soil.
+ 11 27229 29451 Desmodium viridiflorum United States Florida Volusia Barberville By Fla. Rt. 11, 3/4 mile S of Fla. Rt. 40, generally E of Barberville. Sandy old field.
+ 11 28935 29561 Galactia United States Florida Volusia 1 m. E of Astor. On wet sands of pine flatwoods.
+ 11 26912 29498 Galactia elliottii United States Florida Volusia Daytona Beach 6 mi. S Daytona Beach, Volusia Co., Fla. on E side of Halifax River. Sandy site.
+ 11 27222 29756 Indigofera miniata var. leptosepala United States Florida Volusia New Smyrna Beach Turtle Mound Volusia county, ca. nine miles south of New Smyrna Beach just north of Turtle Mound. Serenoa scrub on stabilized sand behind dune ridge of ocea
+ 11 27835 30165 Medicago polymorpha United States Florida Volusia Pierson Rt. 1, Pierson In soil from indian mound, along St. John's River.
Clay2 date added: Monday, July 09, 2012
Duval2 date added: Monday, July 09, 2012
Nassau1 date added: Sunday, July 29, 2012
Top of page.
© 2012 Collaborative Georeferencing
Last updated February, 2012

Custom CSV Spreadsheet



	A	B	C	D	E	F	G	H	I	J
1	CollectionCode	CatalogNumber	ScientificName	Country	State	County	Locality	Latitude	Longitude	Link
2	17	17	Sarracenia flava	USA	FL	Liberty	Wilma Apalachicola National Forest titi bog, Appalachia National Forest, near Wilma. in a sphagnous area, presently dry, titi bog.	30.088636	-85.038262	Georef Me!
3	24	23	Sarracenia flava	USA	FL	Liberty	Sumatra 11.5 miles northwest of Sumatra; slash pine savanna. in open slash pine savanna, with S. psittacina.	30.179543	-85.087362	Georef Me!
4	195	195	Drosera capillaris	USA	FL	Liberty	Hosford Apalachicola National Forest ditches at roadside bordering longleaf pine, wiregrass savanna, 14 miles S of Hosford, Apalachicola National Forest. boggy ditches at roadside bordering longleaf pine, wiregrass savanna.	30.313648	-84.957362	Georef Me!
5	200	200	Drosera capillaris	USA	FL	Liberty	Wilma Apalachicola National Forest titi bog, Apalachicola National Forest, near Wilma. in titi bog.	30.169997	-84.899559	Georef Me!
6	274	274	Drosera tracyi	USA	FL	Liberty	Sumatra ditch bordering pine flatwoods, 11.5 miles N of Sumatra. sandy peaty soil, broad roadside ditch bordering pine flatwoods.	30.277722	-84.910505	Georef Me!
7	459	459	Pinguicula pumila	USA	FL	Liberty	Sumatra Apalachicola National Forest flatwoods, Apalachicola National Forest, by forest road 123, 0.5 mile from Fla. rd 379, NW of Sumatra. burned over longleaf pine flatwoods.	30.023252	-84.980563	Georef Me!
8	520	522	Utricularia cornuta	USA	FL	Liberty	Sumatra pond along hiway 65 near Pleea savannahs, 4 mi NNE of Sumatra. in shallow water of Hypericum pond; near Pleea savannahs.	30.073648	-84.953504	Georef Me!

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