Georeferencing Overview

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iDigBio Georeferencing Working Group (GWG) Train the Trainers I and II

- 5 Days
- Pay-it-forward
- Community Resource
Topics in a 5 day georeferencing course

- Introduction to iDigBio
- **Introduction to Georeferencing**
- Thinking like a Trainer
- Collaboration to Automation
- Geographical Concepts
- Point-RADIUS Method and Best Practices
- **Darwin Core** Standard, Terminology, iDigBio Recommended Fields
- **Georeferencing Quick Reference Guide,** **Locality Types,** Georeferencing Template
- MaNIS/HerpNet/ORNIS Georef Guidelines
- **Internet Resources** – Where to Begin?
- GPS Exercise Introduction
- Georeferencing Using Paper Maps
- Process, Workflows, Priorities, and Collaborations
- KE Emu, KUMIP and Specify, FishNet2
- ORNIS Workflows and Repatriation
- Workflows, FSU Georeferencing Protocol
- Participant Workflows
- **Good and Bad Localities**
- Georeferencing Natural History Collections Data: The **GEOLocate** Project
- Using GEOLocate: Basics, Batch Processing, Collaborative Georeferencing Administrative Portal, Collaborative Georeferencing Web Client, Taxon validation, Web services and integration, Building end-to-end georeferencing workflows
- Data Cleaning, Processing, and Analysis
- Participant/TCN Georeferencing Projects (use your own data sets)
- Batch Georeferencing in Symbiota
- Participant Volunteer Training Demos
Goals of georeferencing (during or after data capture)

• Read and transcribe written materials
• Move accurate data into database
• Use this data to derive a decimal latitude and longitude
  – note that some georeferencing may be automated
  – remember to check if another project may have useful georeference data

• Include (at least)
  – decimal latitude and longitude
  – uncertainty
  – how you did the georeference
  – what sources you used
  – who did the georeferencing
  – any assumptions made
  – the geodetic datum, if known, or assumed
  – a text description of the locality
  – the verbatim coordinates if present
Data Capture and Georeferencing Challenges

- ink
- typed
- pencil
- printed
- stacked
- handwritten
- uneven lines
- colored paper
- non-planar surfaces
- non-standard terms
- non-standard formats
Two main paths to georeferencing

- existing legacy data that needs a georeference

- new data coming into your collections – “born digital”
What is an ideal georeference?

A numerical description of a place that can be mapped and that describes the spatial extent of a locality and its associated uncertainties as well as possible.

from: Collaboration to Automation presentation
You’ll write your own georeferencing guide
here are two (of many possible) resources to refer to

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**GEOREFERENCING**

**QUICK REFERENCE GUIDE**

Version: 2012-10-08

John Wieczorek, David Bloom, Heather Constable, Janet Fang, Michelle Koo, Carol Spencer, Kristina Yamamoto

This is a practical guide for georeferencing using the point-radius method [1, 2, 3] using the Georeferencing Calculator [4, 5], maps, gazetteers, and other resources from which coordinates and spatial boundaries for places can be found. This guide is an update of “Georeferencing for Dummies” [6], and explains the recommended calculation procedure for localities encountered in the georeferencing process.

Georeferences using the methods in this guide will be maximally useful if as much information as possible is captured about and during the georeferencing process in the following fields defined in the Darwin Core standard [7]. For additional community discussion and recommendations, see the Darwin Core Project wiki [8].

Darwin Core Georeferencing terms:

- **decimalLatitude, decimalLongitude, geodeticDatum** – the combination of these three fields provide the reference for the center of the point-radius representation of
General steps in a georeferencing scheme

- Are you georeferencing as you capture data?
  - or doing your georeferencing after data entry?
- Has someone else done it already?
  - UK or Non-UK material?
  - NHM Data Portal - 100Ks georeferences
  - NBN Atlas
- Collate your data to be georeferenced
  - will it be georeferenced in or out of your database?
- Clean data in the database before beginning
  - locality, collecting event data, etc.
- separate specimens
  - coordinates yes, coordinates no
- Standardize locality strings
  - dwc:locality
  - dwc:verbatimLocality
- Group data into logical sets
  - same geographic area, same collecting event, for example
  - collecting events OR each record has its own georeference?
- Clustering
  - creates efficient search strategy
  - optimizes your workflow
- Take advantage of staff, volunteer, visitor skills
  - reads “Russian” or can read old script
  - researchers return material georeferenced
- Tic-Tock, Tic-Tock
Workflow overview (legacy data)

- separate specimens
  - coordinates yes, coordinates no
- clean the data
  - group the data if possible, for georeferencers (country, collector, region, etc.)
- upload (if using GEOLocate), or as is relevant
- identify-verify, use another resource if needed
- add extent and uncertainty
- dwc:georeferenceRemarks and georeferenceProtocol
- export (from GEOLocate)

**visualize your work** (try www.gpsvisualizer.com, Google Earth,…)

- check for completeness in your database (georeferencedBy, georeferencedDate, etc.)
iDigBio Data Quality (DQ) Flags enhance Digitization Workflows

Example: spot and fix georeferencing
Standard terms from DwC for georeferencing

**Darwin Core Location Terms**
- higherGeography
- waterbody, island, islandGroup
- continent, country, countryCode, stateProvince, county, municipality
- verbatimLocality, locality
- minimumElevationInMeters, maximumElevationInMeters, minimumDepthInMeters, maximumDepthInMeters
- decimalLatitude, decimalLongitude, geodeticDatum, coordinateUncertaintyInMeters, georeferencedBy, georeferenceProtocol, georeferenceSources, georeferenceVerificationStatus, georeferenceRemarks

**Darwin Core Event Terms**
- habitat

**Darwin Core Geological Context**
- group, formation, member, bed, …
From the Label, Notebook, …

**field notes**
- 41 05 54S
- 121 05 34W
- WGS84
- 2.5 mi. NE Tlh. on Ctrville Rd.
- Tallahassee, 2.5 miles NE on Centerville Road.
- frequent
- Wakulla
- in moist roadside depression, …

**your database field**
- lat or latitude
- lon or long or longitude
- datum or notes or …
- loc or location or collectorLocality or …
- abundance
- county
- hab or habitatDescription or …

**darwin core**
- verbatimLatitude
- verbatimLongitude
- verbatimSRS
- verbatimLocality
- locality
- (ocurrenceStatus)
- county
- habitat
Darwin Core Georeference Terms

darwin core terms

decimalLatitude
decimalLongitude
geodeticDatum
coordinateUncertaintyInMeters
georeferencedBy
georeferenceProtocol
georeferenceSources
georeferenceVerificationStatus
georeferenceRemarks
coordinatePrecision
pointRadiusSpatialFit
footprintWKT, footprintSRS, footprintSpatialFit

example values

• 30.441115
• -84.295903
• WGS84
• 20
• Susan Somewhere
• Georeferencing Quick Reference Guide
• Falling Rain Gazetteer, GEOLocate
• verified by collector
• assumed distance by road

goal to populate these fields!
Geographical Concepts: Datums

Common Datums

• NAD27 (North American Datum): system derived from land-based surveys, using Clarke 1886 ellipsoid

• NAD83: satellite-based system using the Earth’s center as a reference point; eventually adopted as GRS80 (Geodetic Ref. System 1980)

• WGS84 (World Geodetic System 1984): mathematically refined GRS80 used by the US military and default for GPS

• For most uses, NAD83, GRS80, WGS84 are equivalent
Locality types – *help with steps in georeferencing*

- Named Place
  - Named Place
  - Urban Area
  - Small Town
  - Unbounded Area
  - Street Address
  - Junction
  - Between two named places

- Offsets
  - distance at a setting “by air”
  - distance along a path
What is an ideal georeference?

A numerical description of a place that can be mapped and that describes the spatial extent of a locality and its associated uncertainties as well as possible.

from: Collaboration to Automation presentation
Let’s try one together

Asteraceae

PLANTS OF FLORIDA, USA

Helianthus heterophyllus Nuttall

WAKULLA CO.: St. Marks Nat’l Wildlife Refuge (Panacea Unit). Frequent in moist roadside depression, less so in drying sand of burned, open longleaf pine along W side Rte 372, just N of Rd 401 and 1.4 mi drive from Hwy 98.

2 October 2008

Loran C. Anderson no. 24,198 w/ Wilson Baker & Ann Johnson
R. K. Godfrey Herbarium (FSU)
Introducing **GEO Locate**

- First
Let’s try one together
include (at least) coordinates uncertainty how you did the georeference what sources you used who did the georeferencing any assumptions made the geodetic datum, if known, or assumed a text description of the locality the verbatim coordinates if present
Introducing **GEOLocate**

- **Now**

- **See also**
  - Google Maps
  - challenge
    - get coordinates, figure out how to measure
Let’s try a few of yours

• Download the DemoCSV file
• Go to GEOLocate http://bit.ly/geolocatecsv – see link in wiki
• Our code 972598CD
Georeference by CSV


or load an existing file using a retrieval code: EX: 972598CD
Links to Cool Stuff

- iDigBio [GWG Listserv](#)
- GWG georeferencing help and working group
- videos (vimeo and idigbio)
- georeferencing.org
- Geo-rectify an old (online) map
  - http://www.georeferencer.org/
Internet Resources for Georeferencing – Part 1

- Google Maps: [maps.google.com](http://maps.google.com)
- Hard to find localities: [www.fallingrain.com](http://www.fallingrain.com)
- PLSS/TRS: [www.earthpoint.us](http://www.earthpoint.us)
- UTM map: [www.dmap.co.uk/utmworld.htm](http://www.dmap.co.uk/utmworld.htm)

- See Internet Resources – powerpoint linked on this workshop WIKI

- Georeferencing Quick Guide
- Chapman, et al
- Your Protocol
Georeferencing resources with a UK focus

• Old Maps Online
  – http://www.oldmapsonline.org/

• British Library – maps online
  – http://www.bl.uk/onlinegallery/onlineex/maps/index.html
  – see Maps of the UK
    • http://www.bl.uk/onlinegallery/onlineex/maps/uk/

• British Library – georeferencing project
  – https://www.bl.uk/projects/georeferencing
  – https://www.bl.uk/georeferencer/georefabout.html
  – https://www.bl.uk/georeferencer/georeferencingmap.html

• Location London
  – http://www.history.ac.uk/projects/research/locating-London

• Historical GIS Research Network
  – http://www.hgis.org.uk/resources.htm

• National Library of Scotland
  – Georeferenced Maps http://maps.nls.uk/geo/explore/
    – very cool layers feature

• UK Grid Reference Finder
  – http://gridreferencefinder.com/
Ask the GWG! Thanks

www.idigbio.org

facebook.com/iDigBio
twitter.com/iDigBio
vimeo.com/idigbio
idigbio.org/rss-feed.xml
webcal://www.idigbio.org/events-calendar/export.ics

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