



Georeferencing Overview

University of Florida

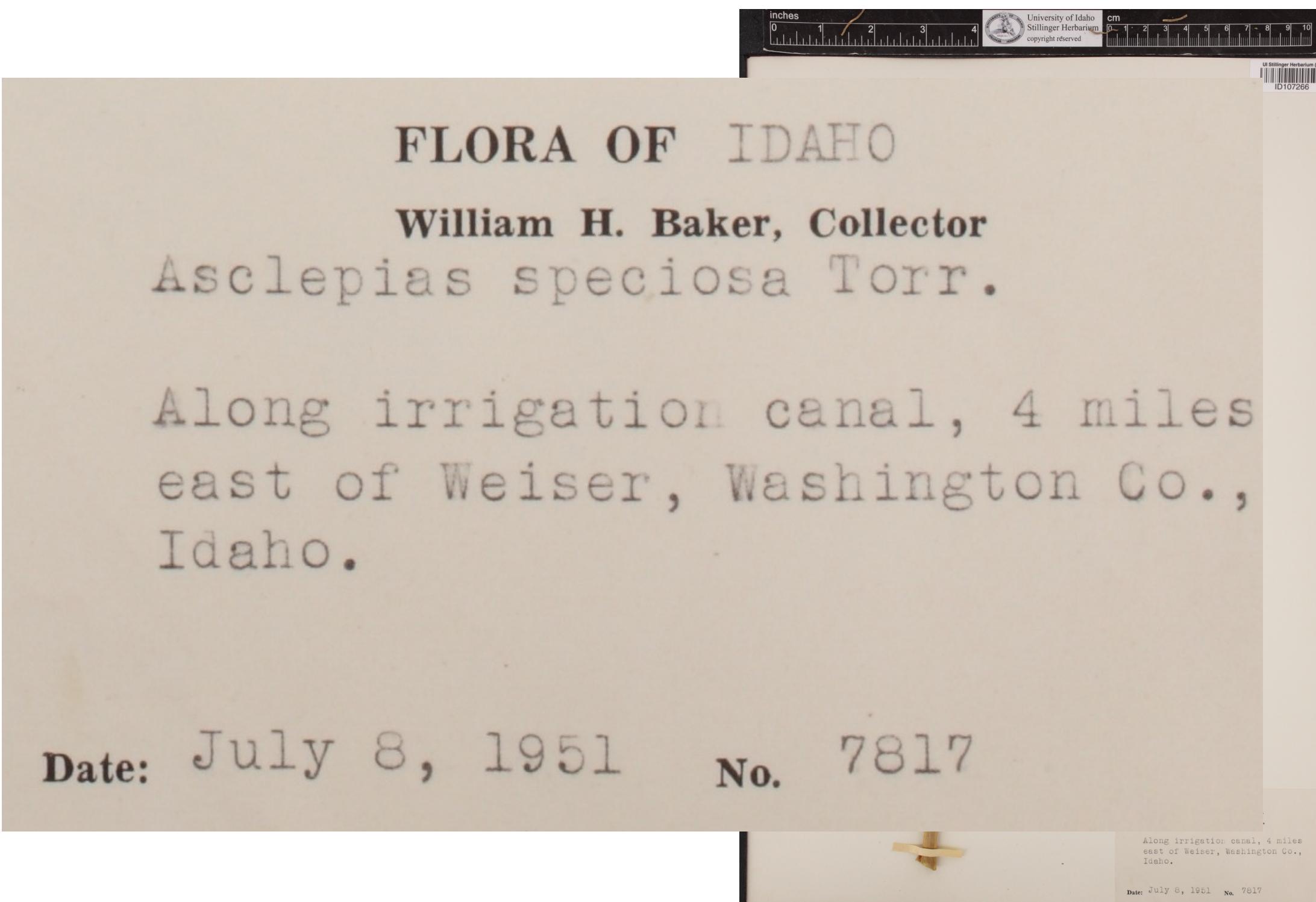


Created by Blaine Marchant, Grant Godden, and
Charlotte Germain-Aubrey



BiotaPhy

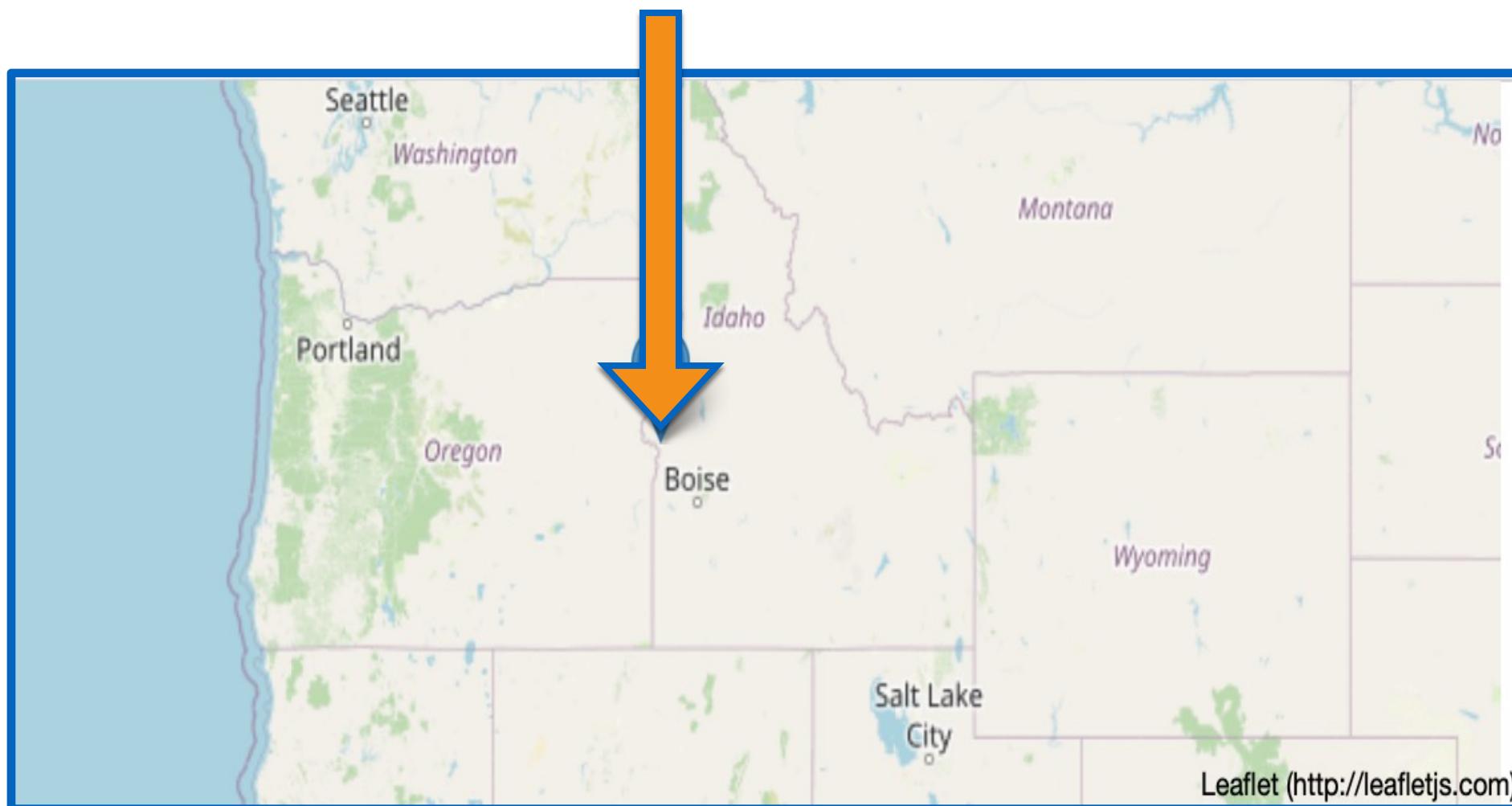
What is a georeference?



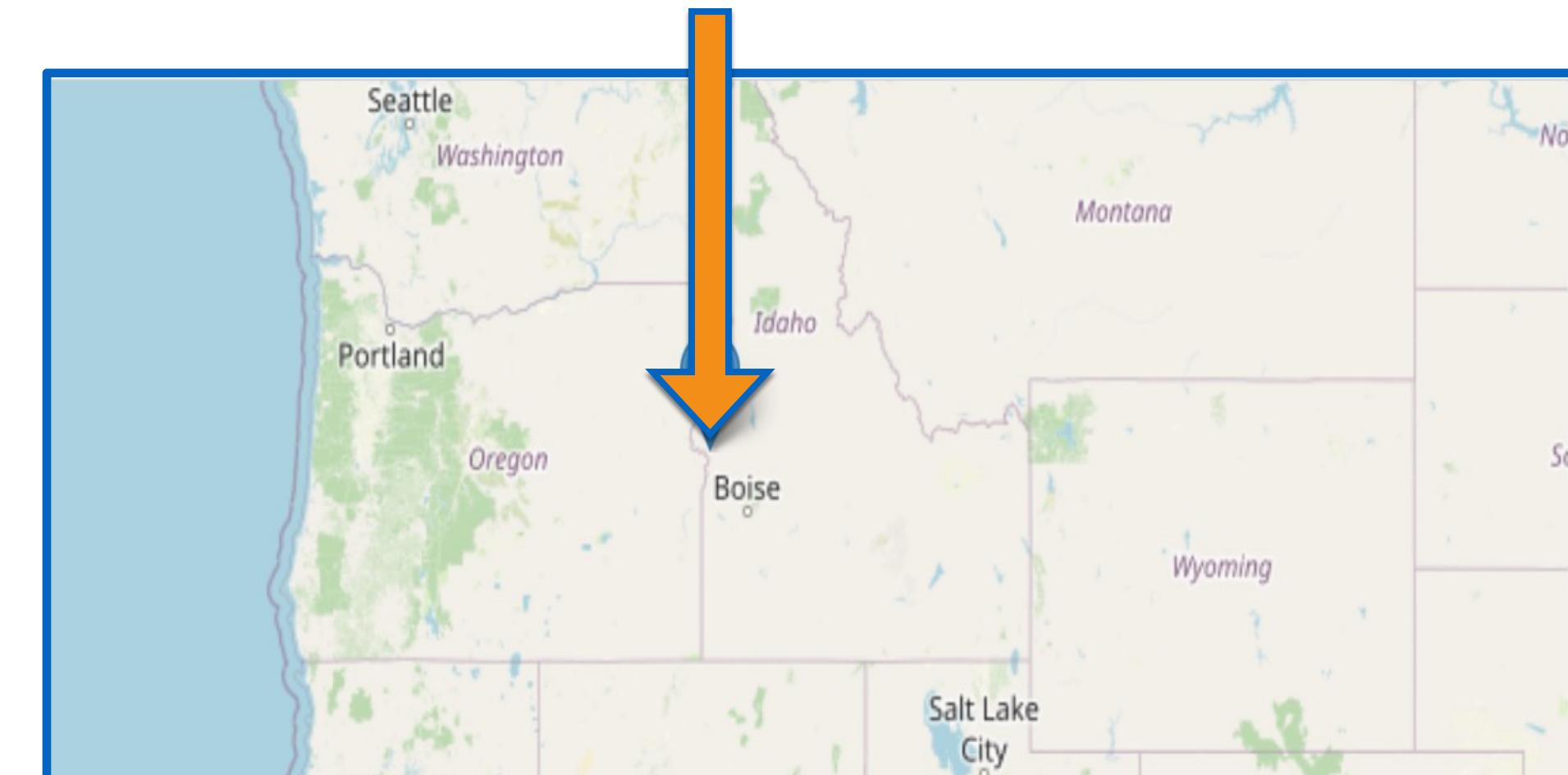
***Asclepias speciosa* Torr.**

**Along irrigation canal, 4 miles east of
Weiser, Washington Co., Idaho.**

What is a georeference?



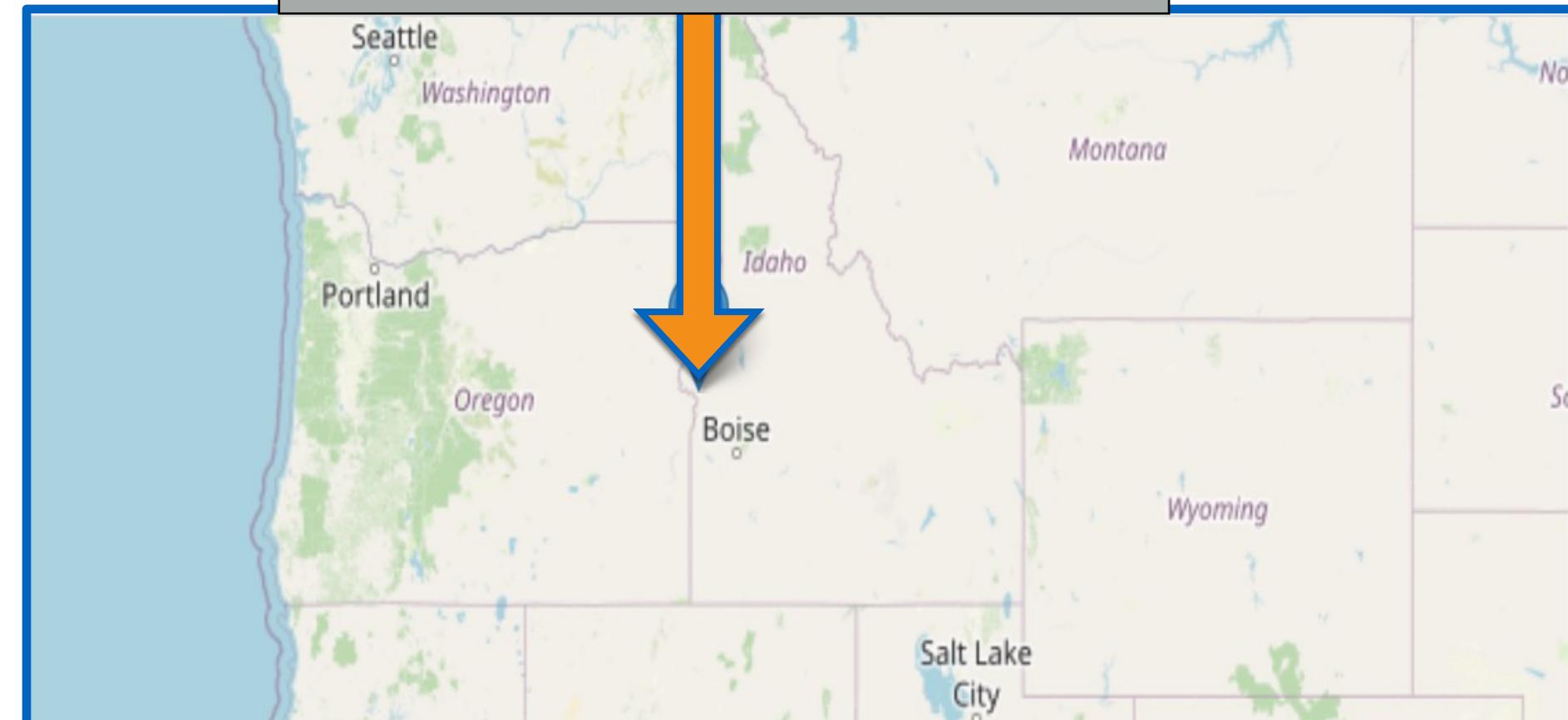
What is a georeference?



A numerical description of a place that can be mapped

What is a georeference?

44.23, -116.88

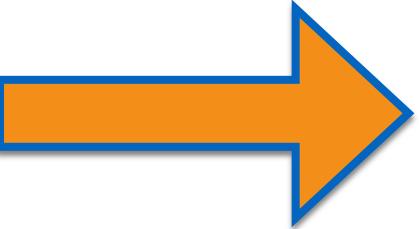


A numerical description of a place that can be mapped

What is a georeference?

Asclepias speciosa Torr.

Along irrigation canal, 4 miles east of
Weiser, Washington Co., Idaho.



44.23, -116.88

Why georeference?

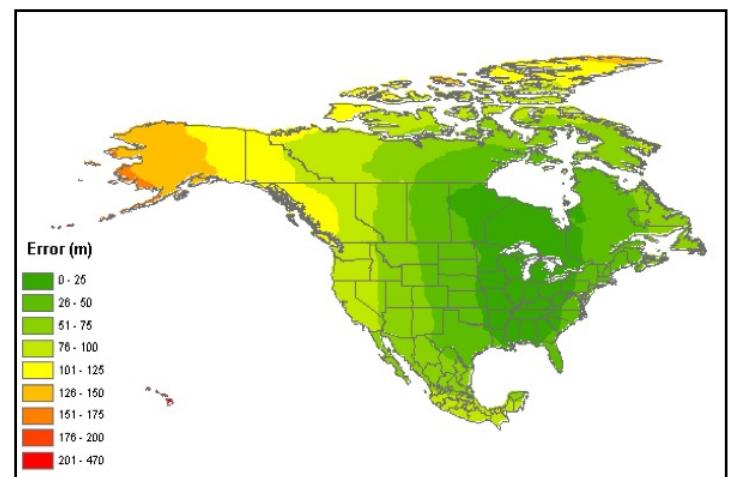
- Add more occurrences to a data set
- Correct geographic and specimen identification data = dependable occurrence record
- Provide uncertainty data, which allow points to be evaluated regarding fitness for research applications and the resulting quality of output

Sources of uncertainty

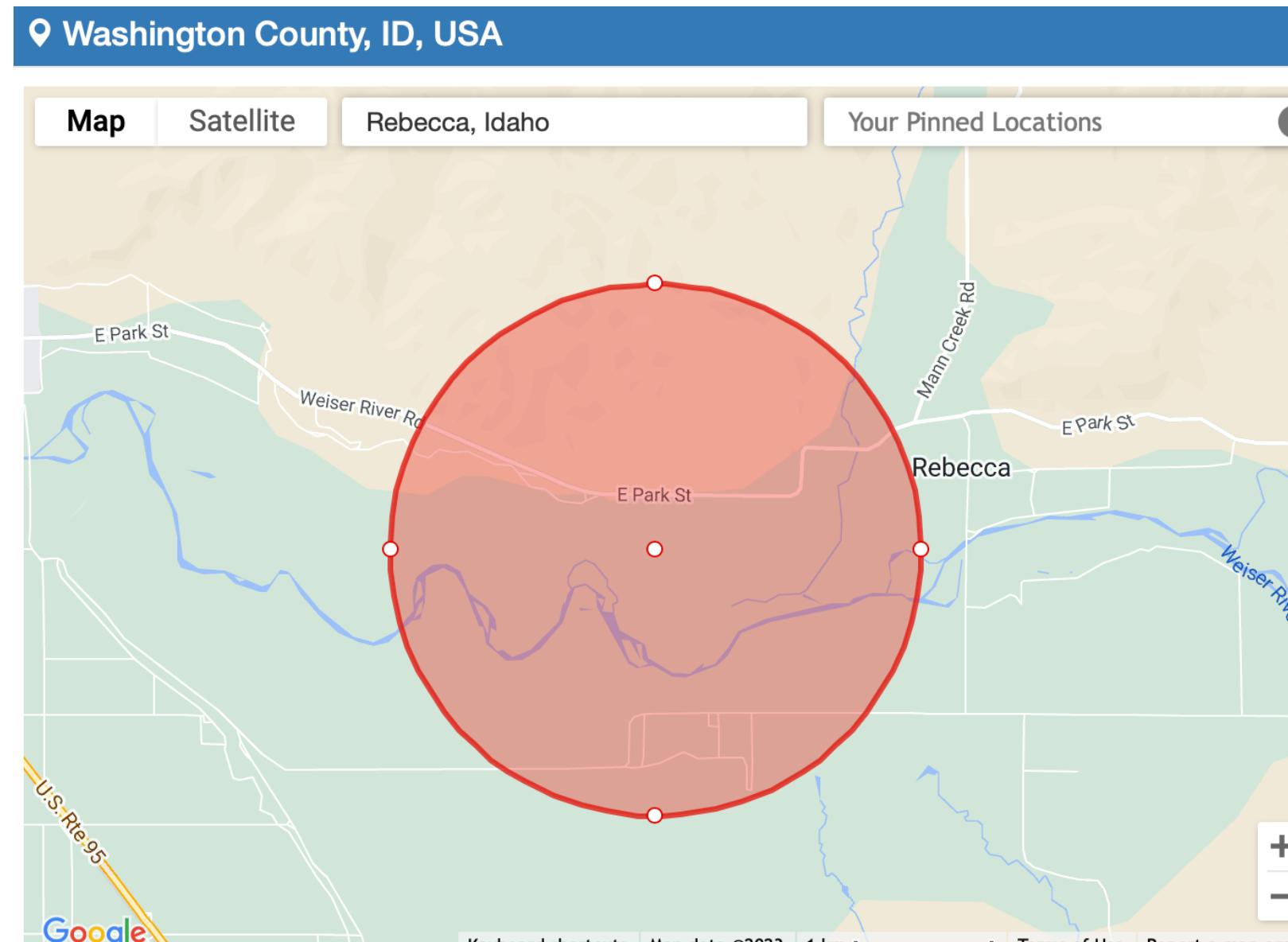
20° 30' N 112° 36' W

- Coordinate uncertainty
 - Map scale
 - GPS accuracy
 - Unknown datum
 - Imprecision in direction measurements
 - Imprecision in distance measurements
 - Extent of locality

Scale	Uncertainty (ft)	Uncertainty (m)
1:1,200	3.3 ft	1.0 m
1:2,400	6.7 ft	2.0 m
1:4,800	13.3 ft	4.1 m
1:10,000	27.8 ft	8.5 m
1:12,000	33.3 ft	10.2 m
1:24,000	40.0 ft	12.2 m
1:25,000	41.8 ft	12.8 m
1:63,360	106 ft	32.2 m
1:100,000	167 ft	50.9 m
1:250,000	417 ft	127 m



Coordinate uncertainty



Locality

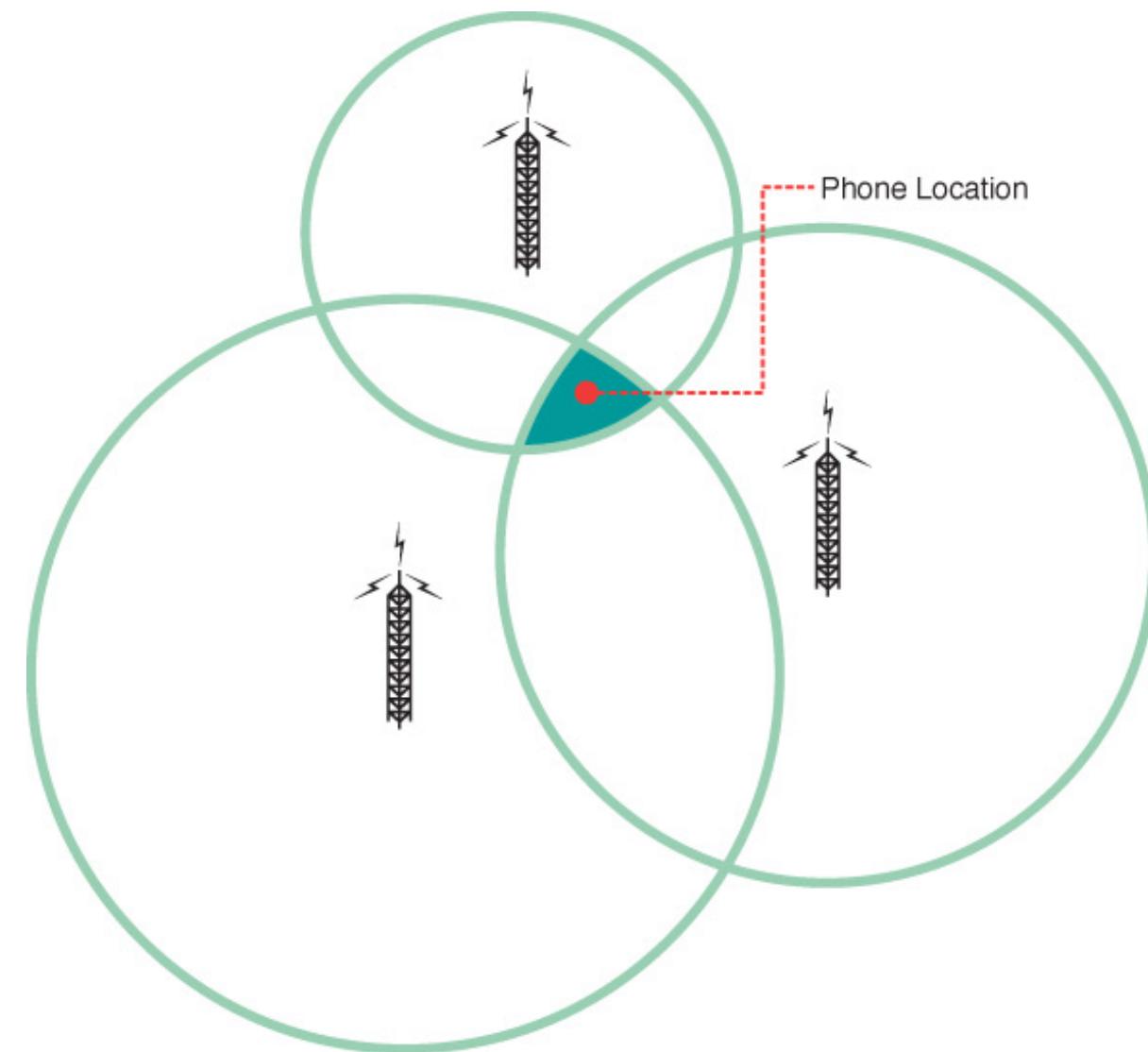
Country	U.S.A.
Country Code	US
State / Province	Idaho
County	Washington
Higher Geography	U.S.A., Idaho, Washington County
Continent	north america
Locality	4 miles east of Weiser.
Habitat	Along irrigation canal.
Decimal Latitude	44.235228
Decimal Longitude	-116.886394
Coordinate Uncertainty In Meters	1956
Geodetic Datum	WGS 84
Georeferenced By	Lindsey Clemens

Coordinate Uncertainty in Meters: 1956 m

Map scale



GPS accuracy



Datum

What is a datum?

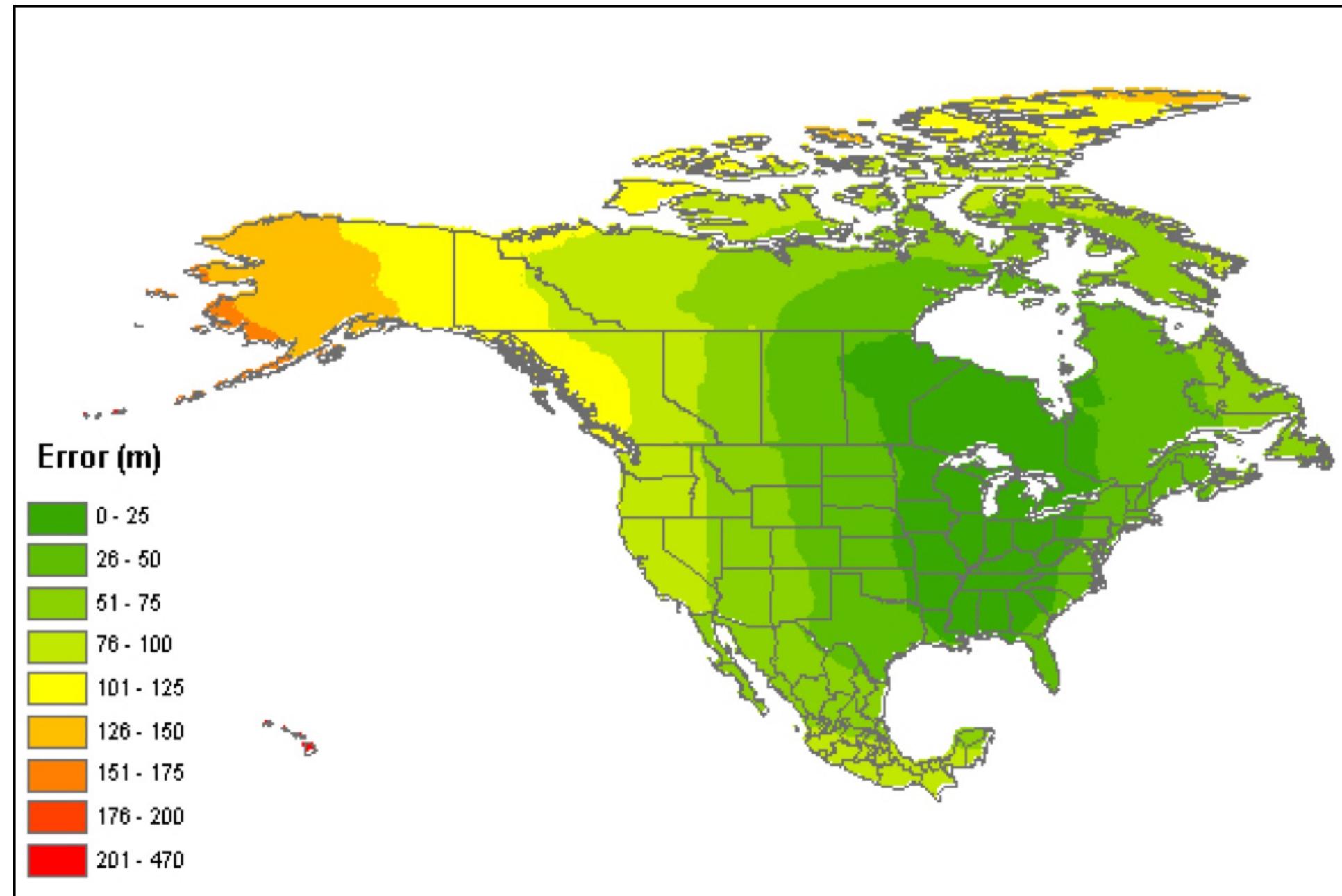
A geodetic datum is an abstract coordinate system with a reference surface (such as sea level) that serves to provide known locations to begin surveys and create maps. In this way, datums act similar to starting points when you give someone directions.

Geodetic datum

A model of the Earth used for geodetic calculations (related to Earth's figure, orientation, and gravity). A geodetic datum describes the size, shape, origin, and orientation of a coordinate system for mapping the surface of the Earth.

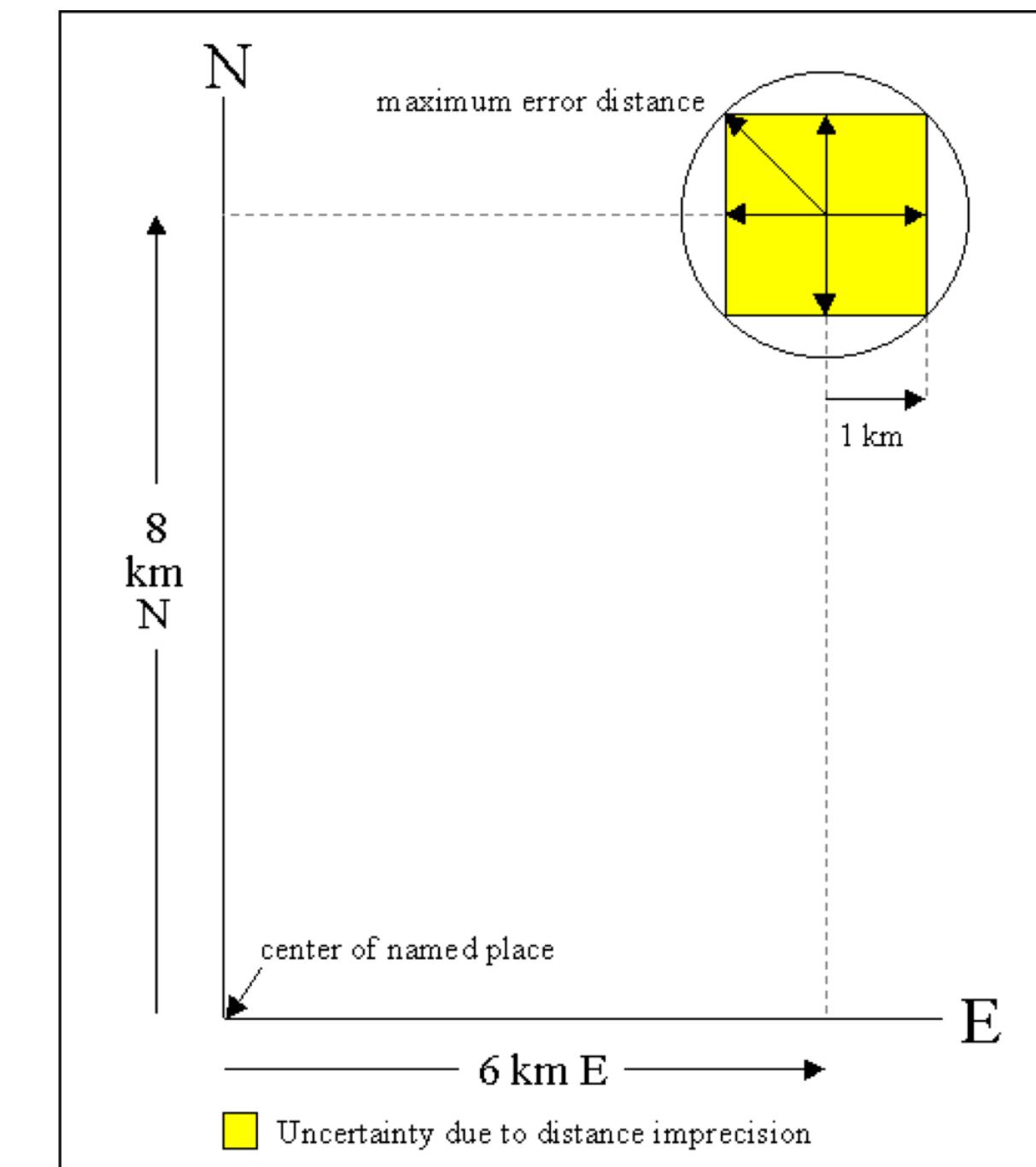
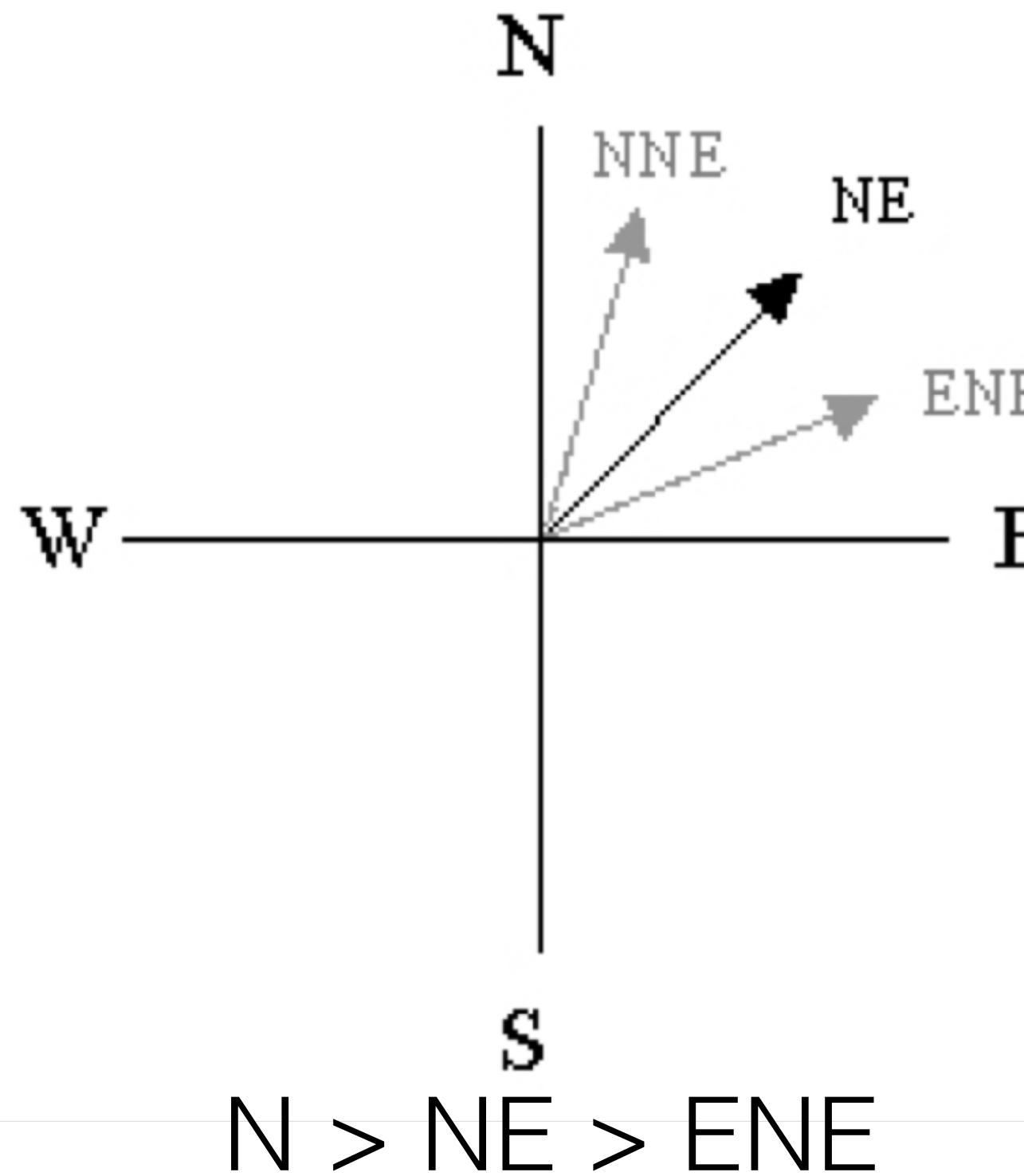
<https://oceanservice.noaa.gov/facts/datum.html#:~:text=A%20geodetic%20datum%20is%20an,when%20you%20give%20someone%20directions.>

Datum uncertainty

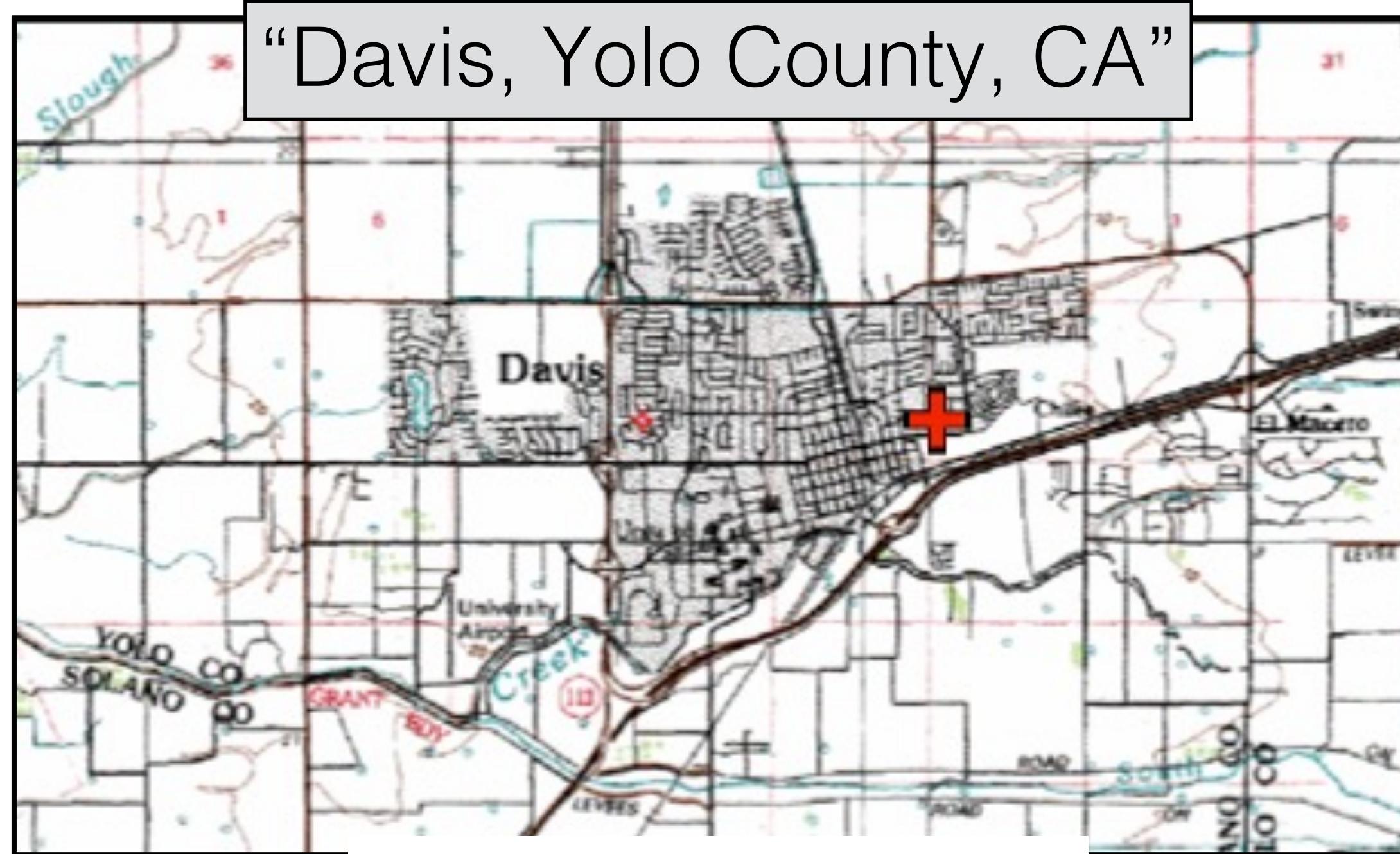


Error assuming NAD27 vs NAD83 or WGS84

Direction and Distance measurement uncertainty



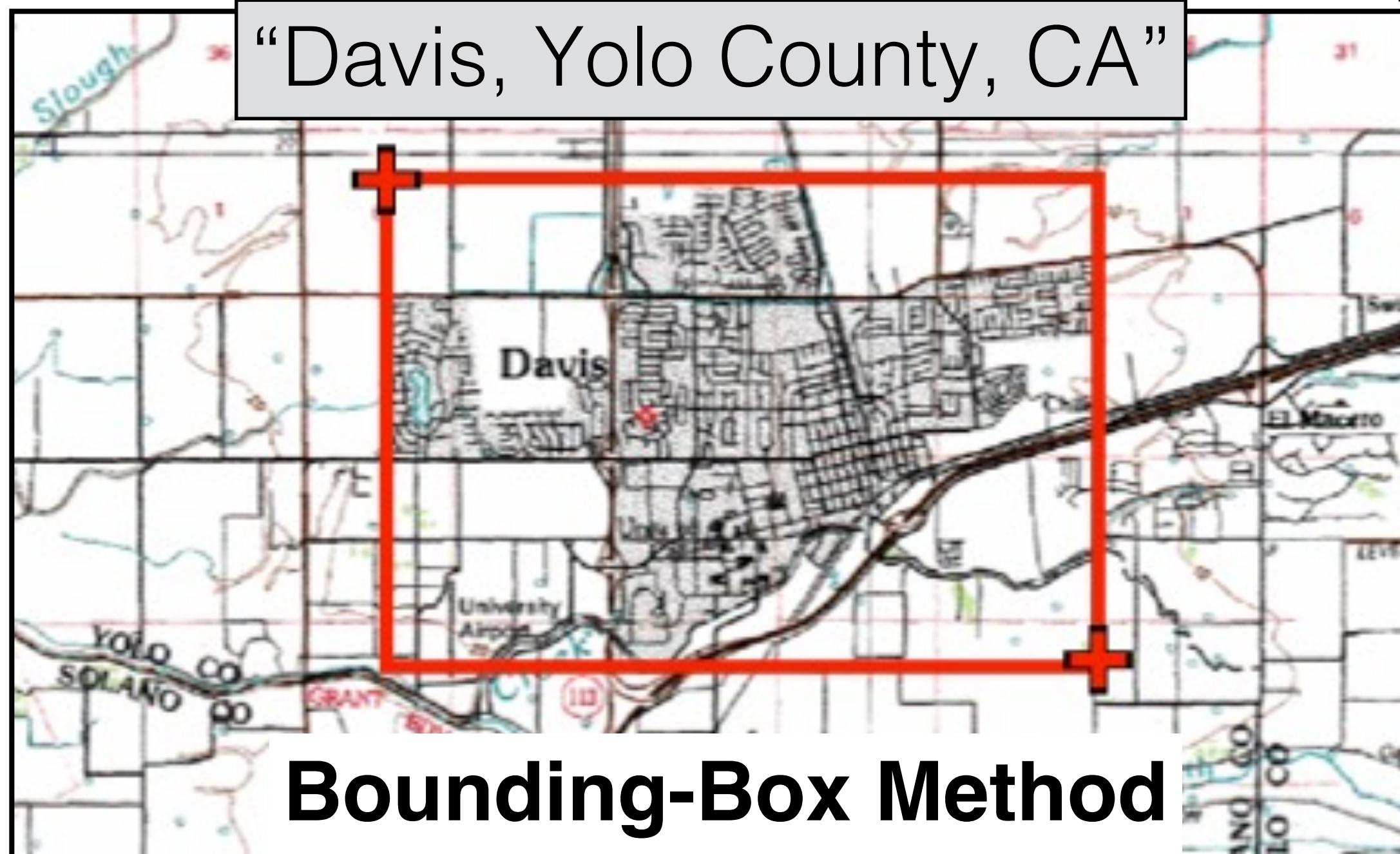
Extent of locality uncertainty



Point Method

38.5463, -121.7425

Extent of locality uncertainty

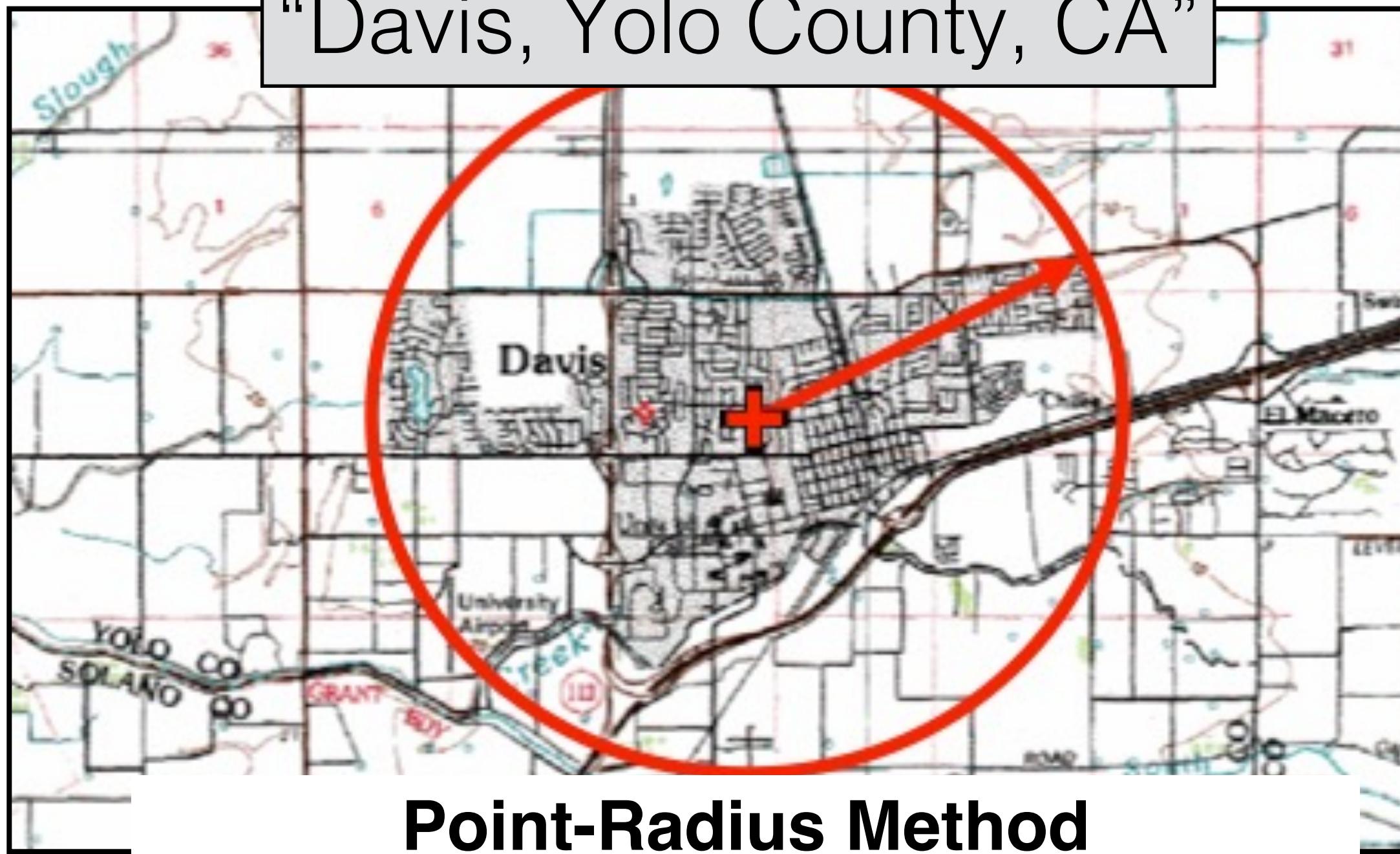


Bounding-Box Method

38.5486, -121.7542
38.545, -121.7394

Extent of locality uncertainty

“Davis, Yolo County, CA”

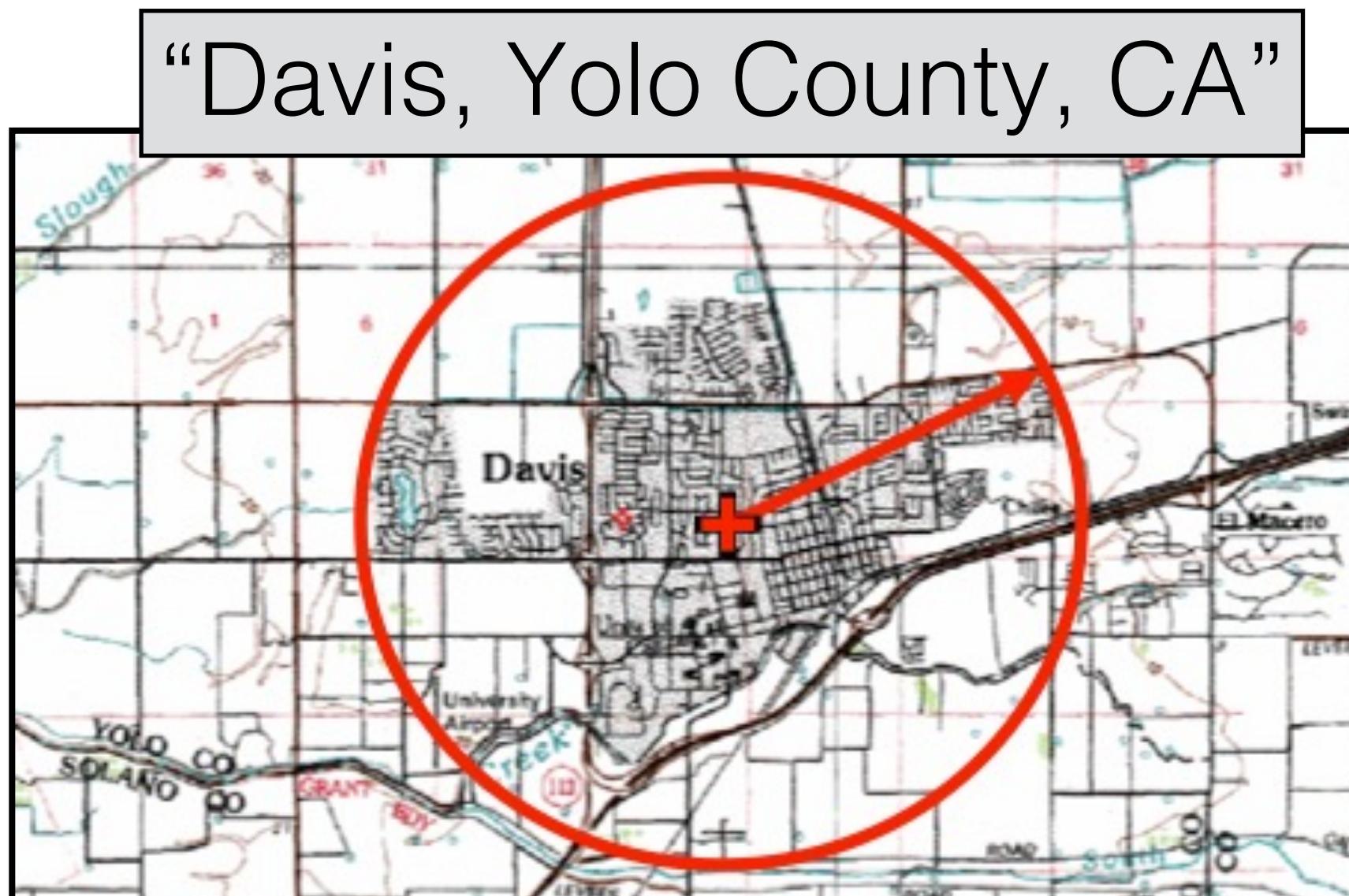


Point-Radius Method

38.5468, -121.7469

Uncertainty radius: 8325 meters

Extent of locality uncertainty



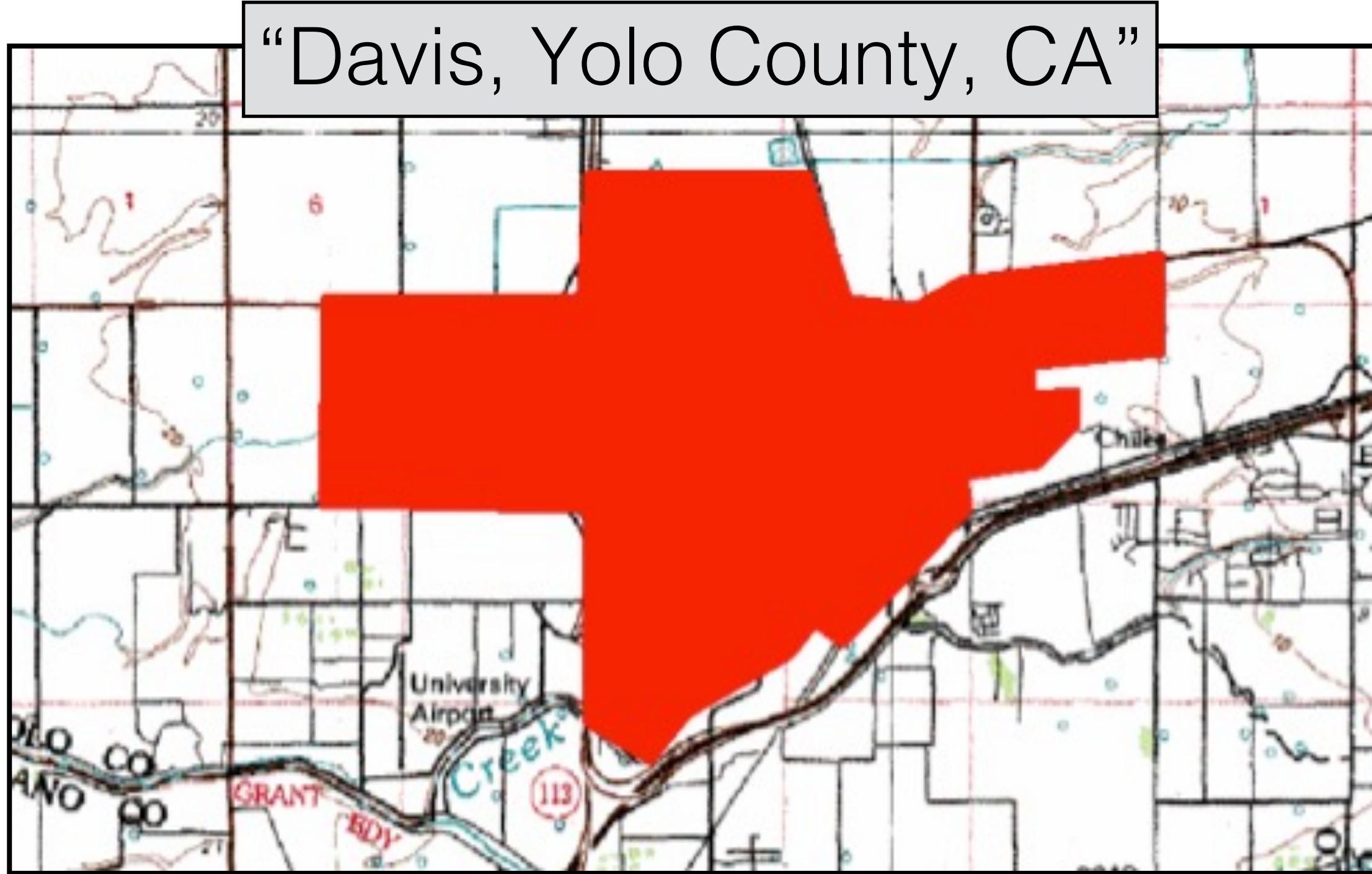
Point-Radius Method

38.5468, -121.7469

Uncertainty radius: 8325 meters

Note the uncertainty! If greater than the size of your variable layers, throw the locality away!

Extent of locality uncertainty



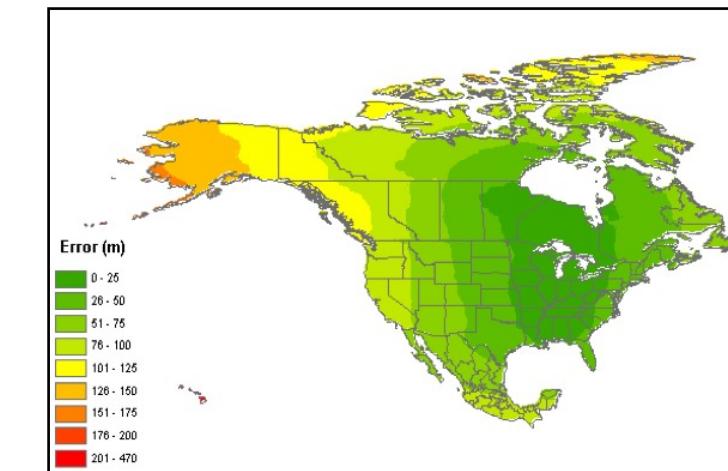
Shape Method

Sources of Uncertainty

- Coordinate uncertainty
- Map scale
- GPS accuracy
- Unknown datum
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- Imprecision in distance measurements
- Extent of locality

20° 30' N 112° 36' W

Scale	Uncertainty (ft)	Uncertainty (m)
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1:63,360	106 ft	32.2 m
1:100,000	167 ft	50.9 m
1:250,000	417 ft	127 m



What is an *ideal* georeference?

What is an *ideal* georeference?

A numerical description of a place that can be mapped

What is an *ideal* georeference?

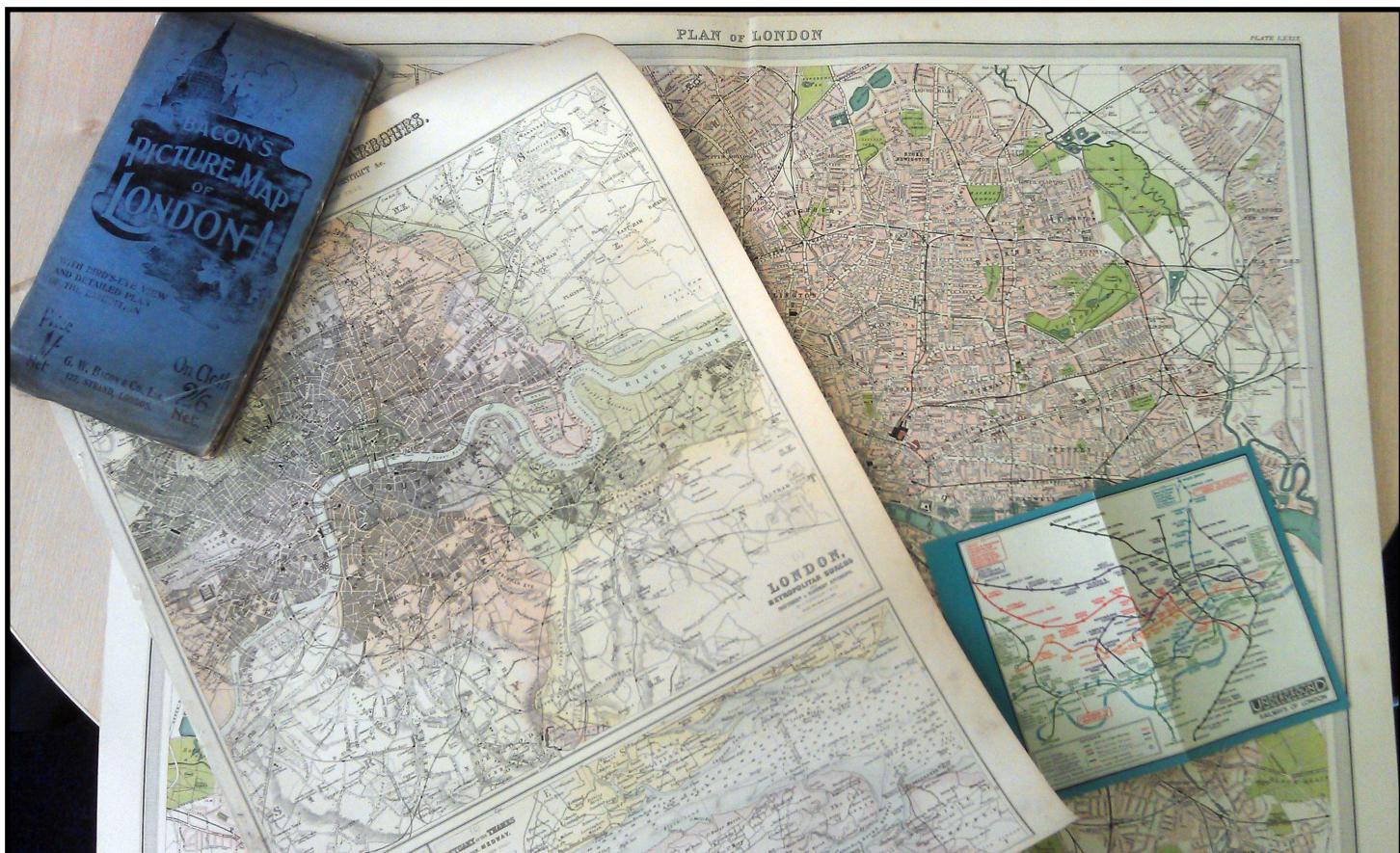
A numerical description of a place that can be mapped

and that describes the spatial extent of a locality and its associated uncertainties

How to do it?

Paper Maps

- Time-consuming
- Good quality paper maps may be hard to find



Internet Resources



GEOLocate

<https://www.geo-locate.org/>

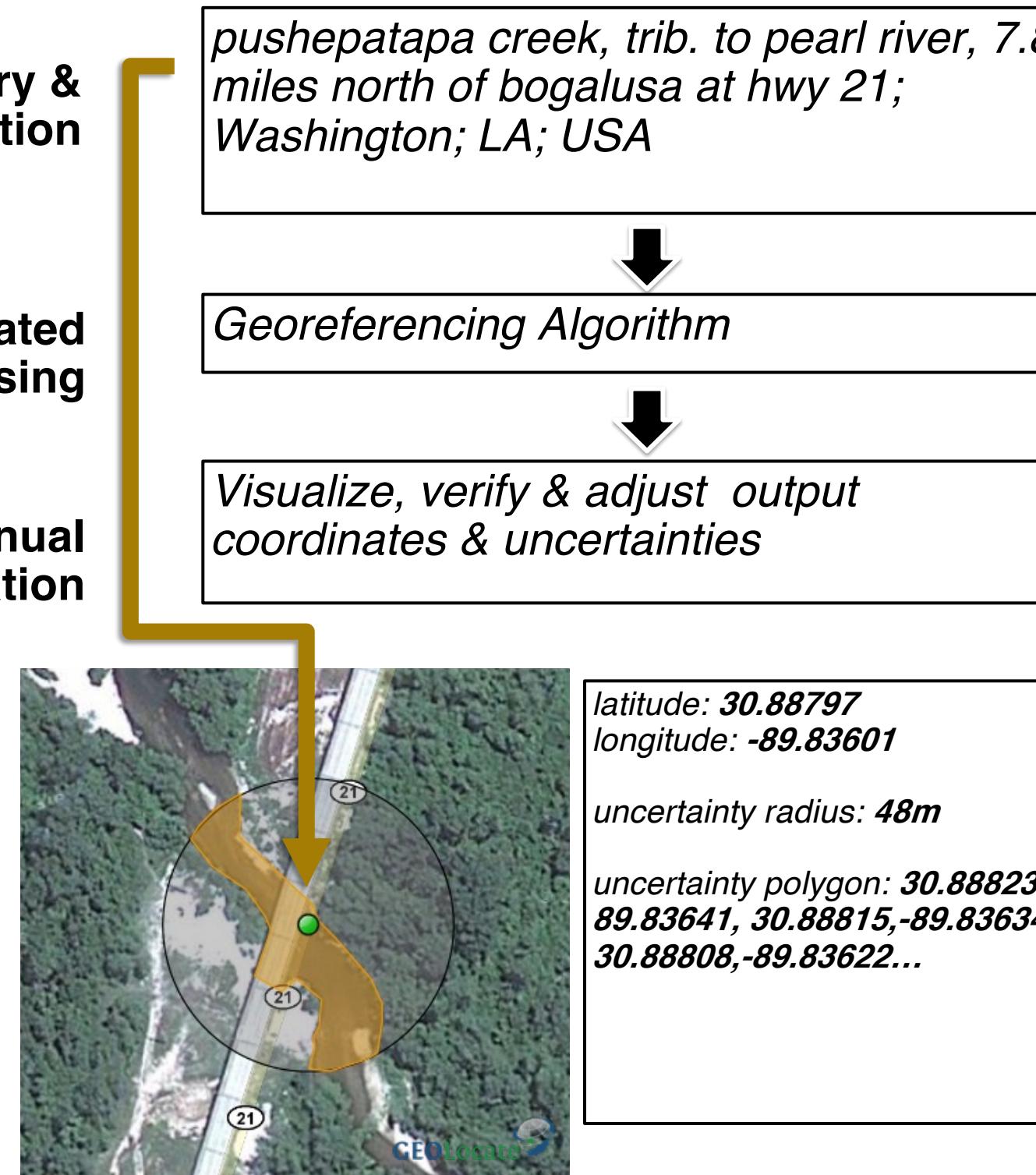
- Software services for georeferencing of natural history collection data
- Automated georeferencing
- Verification and correction
- Multi-lingual
- Interoperability
- Training
- Uncertainty determination
- Batch processing
- Collaborative georeferencing
- Geographic visualization
- Kml export

The screenshot displays the GEOLocate Web Application interface. At the top, there's a navigation bar with links to Home, Standalone App, Java Client, Web Application, Collaborative Georeferencing, Developer Resources, Workshops, and Support and Contacts. Below the navigation is a large satellite map of North America and parts of the Arctic and Europe. A smaller window titled "GEOLocate v.2.13" shows a detailed map of a local area with roads, rivers, and a green dot indicating a georeference point. To the right of this are two smaller windows: one titled "GEOLocate TerraService Mapper 1 meter Aerial" showing a high-resolution aerial photograph of a landscape, and another titled "GEOLocate TerraService Mapper 2 meter Topo" showing a topographic map with contour lines. At the bottom, a table titled "Locality Data - \\\Poweredge\users\nelson\sample.csv" lists several localities with their coordinates and details.

Locality String	Country	State	County	Lat	Lon	Corrected	Precision	Error
Green River at Roachville ford approximately 2 mi. E. of Greensburg	USA	Kentucky	Green	37.27389	-85.461669	no	High	37.
Alabama River at Wilcox Bar; River Mile 120.	USA	Alabama	Wilcox	31.974167	-87.438866	no	High	31.
Missouri River 2 mi. SE of Pierre, South Dakota	USA	South Dakota	Hughes	44.337399	-100.307583	no	High	44.
Natalahny River at U.S. Hwy. 190	USA	Louisiana	Tangipahoa	30.504049	-96.545686	no	High	30.
Tussahaw Creek at LeGum Mill Road, approximately 3.5 mi. ENE Locust Grove - Segment 3.	USA	Georgia	Henry	33.383216	-84.032236	no	High	33.
Ecatecupa River at Hwy. 612.	USA	Mississippi	George	30.611946	-88.465337	no	High	30.
South Fork Little Red River at Arkansas Hwy. 99, SW Clinton, Section 11.	USA	Arkansas	Benton	35.646469	-92.585231	no	High	35.
Little Pine Broken Creek at Hwy. 99, T4N R32W Sec. 4.	USA	Florida	Escanaba	30.304123	-87.446597	no	High	30.
Little Pine Broken Creek, 2.0 mi. S of Bogalusa on Hwy 21	USA	Nebraska	Jefferson	40.0526	-97.0381	no	High	40.
Pushepatpa Creek, 7.8 mi. N of Bogalusa on Hwy 21	USA	Louisiana	Washington	30.688118	-89.535979	no	High	30.

GeLocate Workflow

- 1 Data Entry & Preparation
- 2 Automated Processing
- 3 Manual Verification



GeoLocate Workflow

Home | Web Application | Collaborative Georeferencing | Developer Resources | Education & Outreach | Support and Contacts



GEOLocate



A Platform for Georeferencing Natural History Collections Data

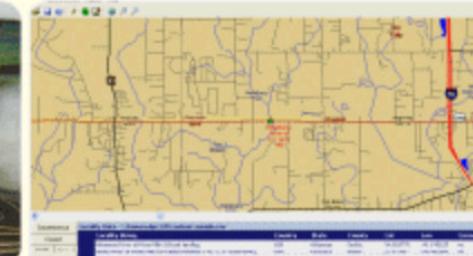
For Users:

- Overview
- GEOLocate Web Clients
- Collaborative Georeferencing
- Education & Outreach

Brief overview (video) of the GEOLocate Project.

For Developers:

- Web Services
- Embeddable Web Client



Web Applications

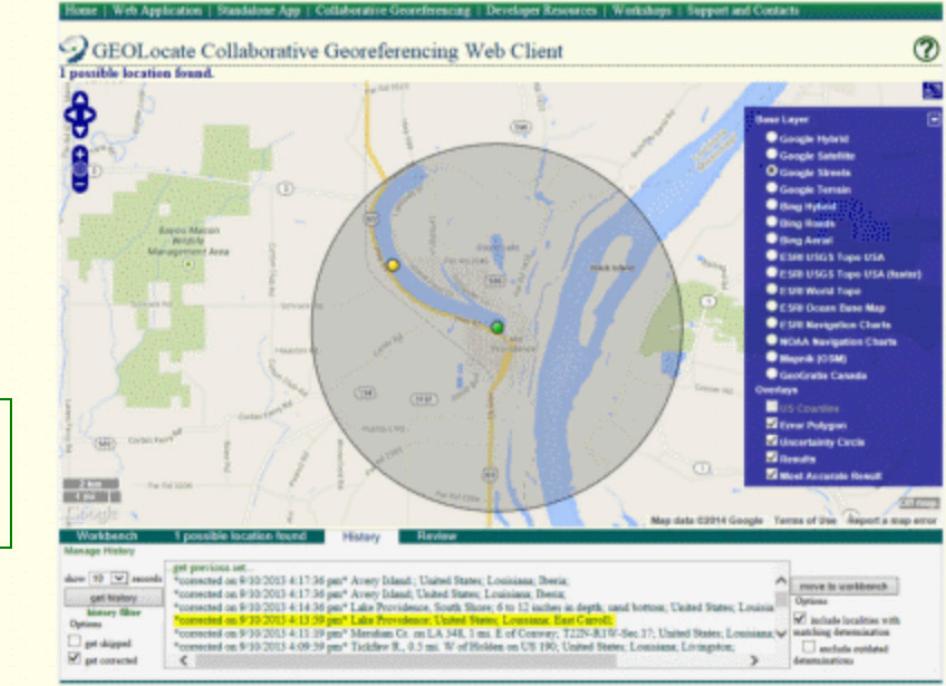
Georeference collections data using your web browser. Quick and easy georeferencing.

Web Services

Integrate georeferencing into your own databases and applications using GEOLocate webservices.

Collaborative Georeferencing

Build communities, share data, relate records across collections and improve verification efficiency.



GeoLocate Workflow

[Home](#) | [Web Application](#) | [Collaborative Georeferencing](#) | [Developer Resources](#) | [Education & Outreach](#) | [Support and Contacts](#)

Web Based Clients

The following based web clients are available to allow you to georeference data directly from your web browser:



Standard Client

Simply type in your locality description and get back georeferenced results. Start here if you are new to GEOLocate.



Batch (File Based) Client

Allows you to upload a .csv file and batch process it. ([file formatting instructions](#))



Collaborative Georeferencing Client

Utilizes the collaborative georeferencing framework. Ideal for largescale multi-institution projects. ([https link](#))

Note: if you use the secure SSL (HTTPS) link, please make sure your browser is configured to allow mixed content, or you may see a blank map. Here are SSL configuration instructions for various browsers: in [English](#) and in [Spanish](#) (special thanks to David Draper for the Spanish translation).

Embeddable client

- A streamlined web client for the purpose of embedding in other web applications.
[Sample link](#) demonstrating use this client.
[Documentation link](#) on how to craft URLs for this client.

Other Clients:

- Arctos
- Specify
- Symbiota
- Tropicos

Know of any other web based clients using GEOLocate? [Let us know](#) and we will be happy to list them.

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GEOLocate Web Application

A world map showing landmasses and coastlines. A small red circle highlights a location in North America.

Map controls include a compass rose, zoom (+/-) buttons, and a scale bar (2000 km / 1000 mi). A 'Off map.' button is located in the bottom right corner of the map area.

Google logo and Map data ©2022 Imagery ©2022 NASA, TerraMetrics | Terms of Use

Workbench **Results**

Georeference Options Draw polygon Place marker Measure

Locality String: Waccasassa Bay State Park, FL, Fibon Factory Road (dirt road, 11 miles east of state owned), north of Cow Creek

Country: UNITED STATES OF AMERICA latitude: longitude: uncertainty: error polygon

State: FL

County: Lee

GeoLocate Workflow

Home | Web Application | Collaborative Georeferencing | Developer Resources | Education & Outreach | Support and Contacts

GEOLocate Web Application

The map displays a rural landscape with roads labeled 98, 19, and 121. Several location markers are present, including "Waccasassa Bay State Preserve Outstanding...", "Goethe State Forest", "Opal-Onyx Dalmatians", "Living Waters Life Center", "Coffey Break Farm", and "Tidewater Trailhead". A red circle highlights the search results section at the bottom of the interface.

Workbench 7 possible locations found

Georeference Options Draw polygon Place marker Measure

Locality String: Waccasassa Bay State Preserve: Fiber Factory Road (dirt road, 4 km are state-owned), north of Cow Creek

Country: UNITED STATES OF AMERICA

State: FL

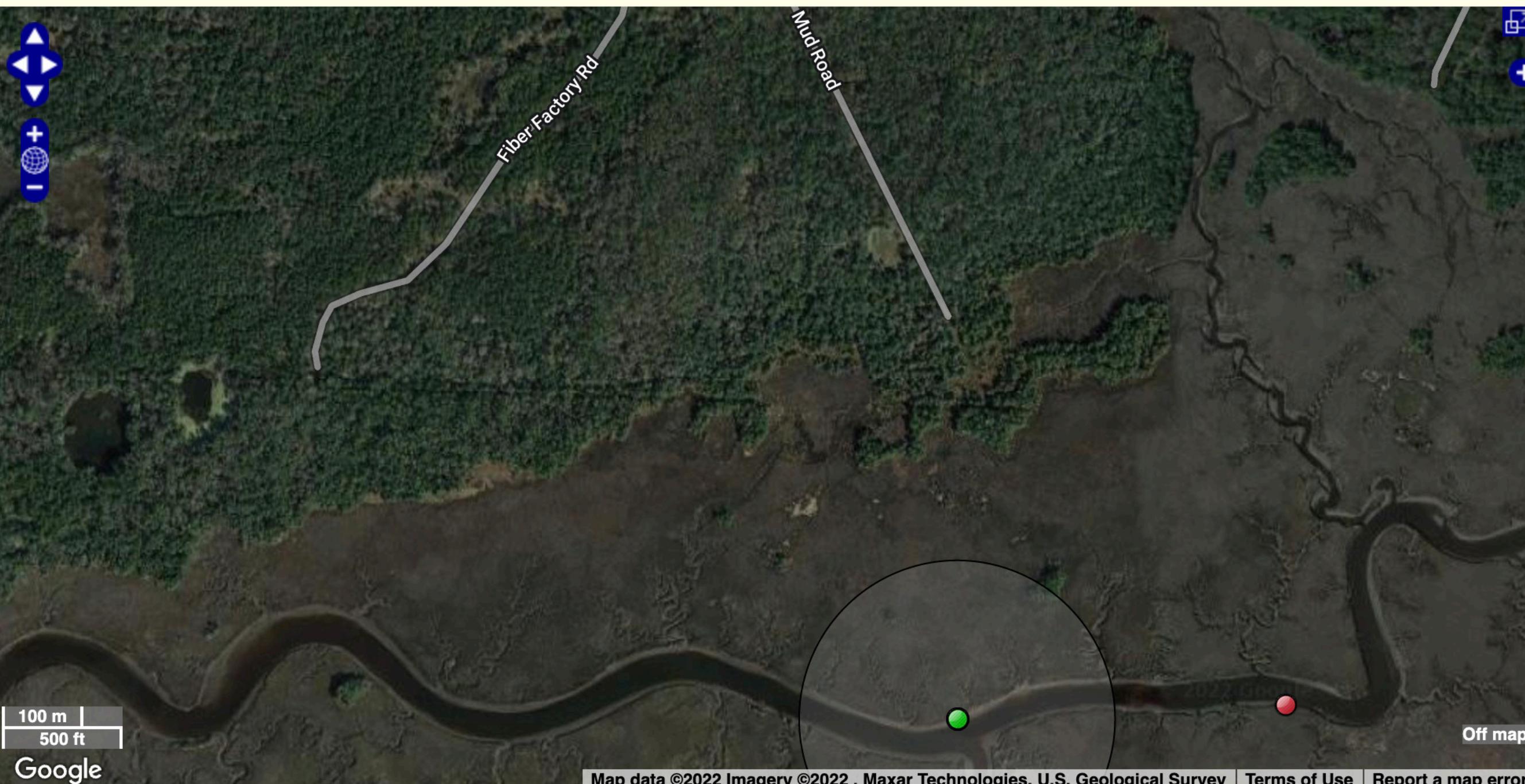
County: Levy

latitude: 29.181676 longitude: -82.754334 uncertainty: Unavailable error polygon

29.181676 -82.754334 Unavailable Unavailable



GEOLocate Web Application



Workbench 7 possible locations found

| Draw polygon Place marker Measure

Locality String: Waccasassa Bay State Preserve; Fiber Factory Road (dirt road, 4 km are state-owned), north of Cow Creek

Country: UNITED STATES OF AMERICA latitude: 29.181676 longitude: -82.754334 uncertainty: 210 m error polygon

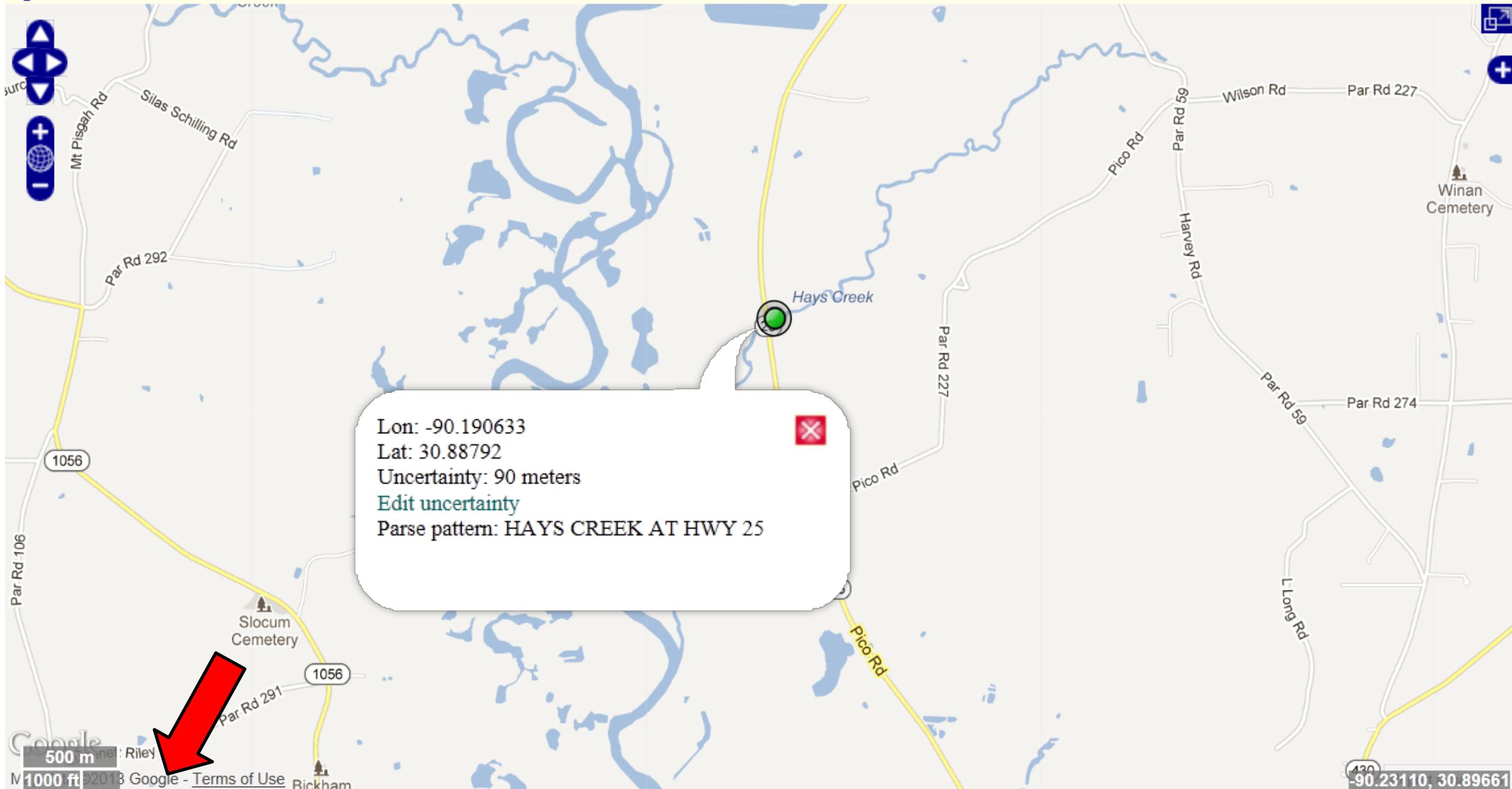
State: FL 29.181676 -82.754334 210 Unavailable

County: Levy

GEOLocate Web Application



1 possible location found



Workbench

1 possible location found

Georeference

Options

| Draw polygon Place

marker

Measure

Locality String: Hays Creek, 3 mi. n of Franklinton on hwy. 25

Country:

UNITED STATES OF AMERICA

latitude: 30.8879

92 longitude: -90.190633

uncertainty: 90 nm

error polygon

State:

1

30.8879

-90.19061

90 Unavailable

County

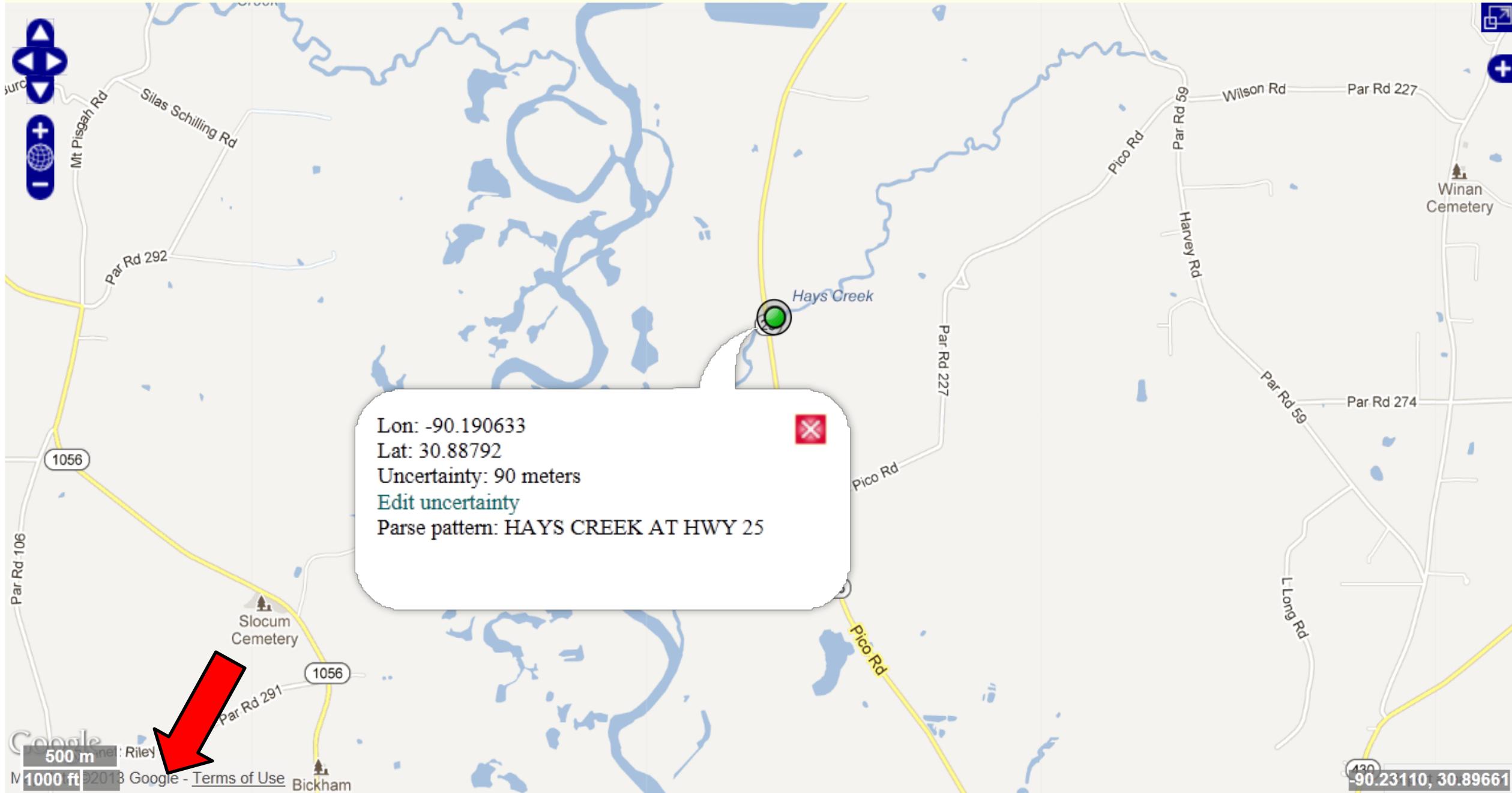
Washington



GEOLocate Web Application



1 possible location found.



Workbench

1 possible location found

Georeference

Options

Draw polygon Place marker Measure

Locality String: Hays Creek, 3 mi. n of Franklinton on hwy. 25

Country:

UNITED STATES OF AMERICA

latitude: 30.88792

longitude: -90.190633

uncertainty: 90 m

error polygon

State:

La

30.88792

-90.190633

90

Unavailable

County:

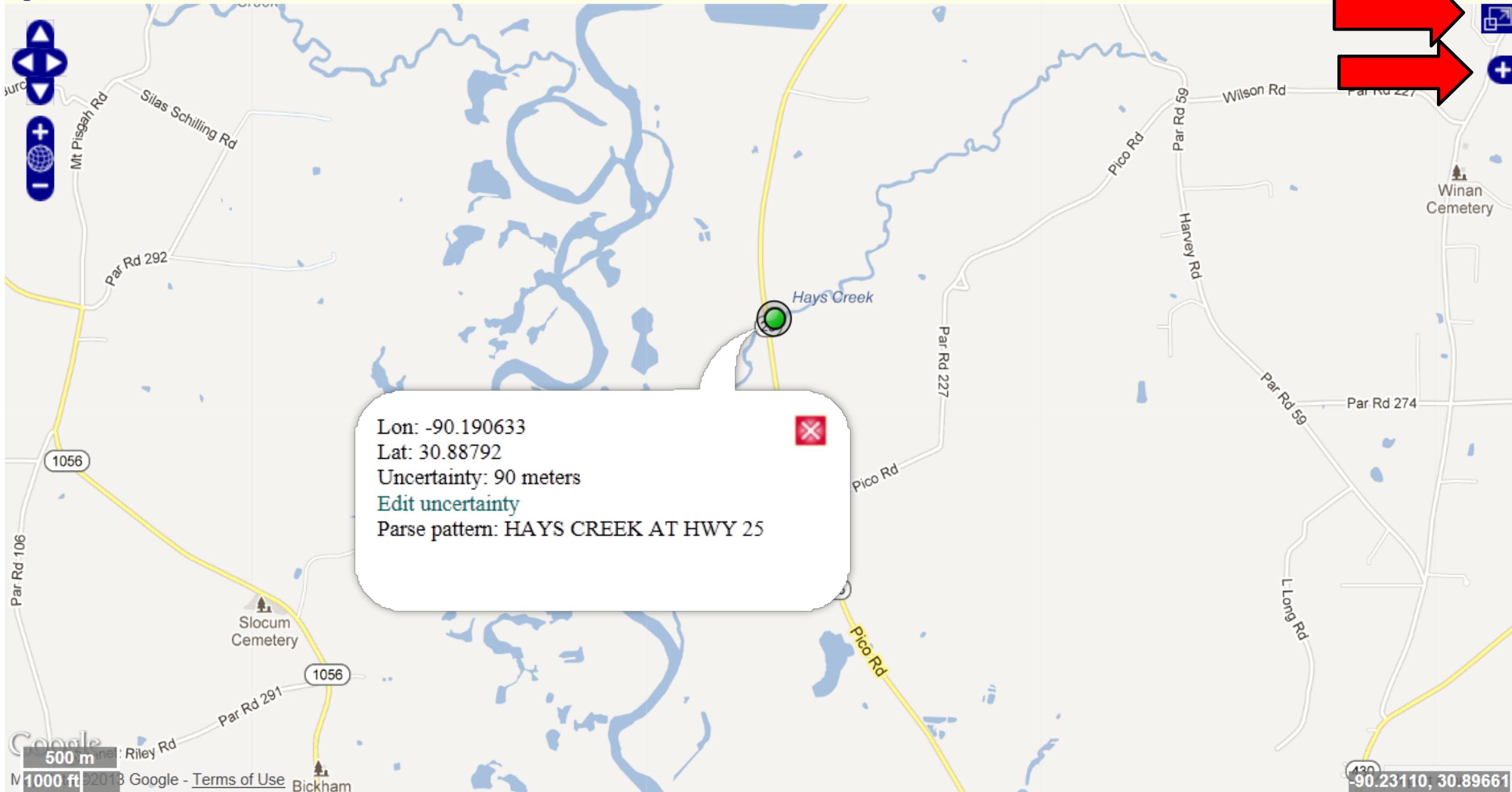
Washington



GEOLocate Web Application



1 possible location found.



Workbench

1 possible location found

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Draw polygon

Place marker

Measure

Locality String: Hays Creek, 3 mi. n of Franklinton on hwy. 25

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uncertainty: 90 m

error polygon

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30.88792

-90.190633

90

Unavailable

County:

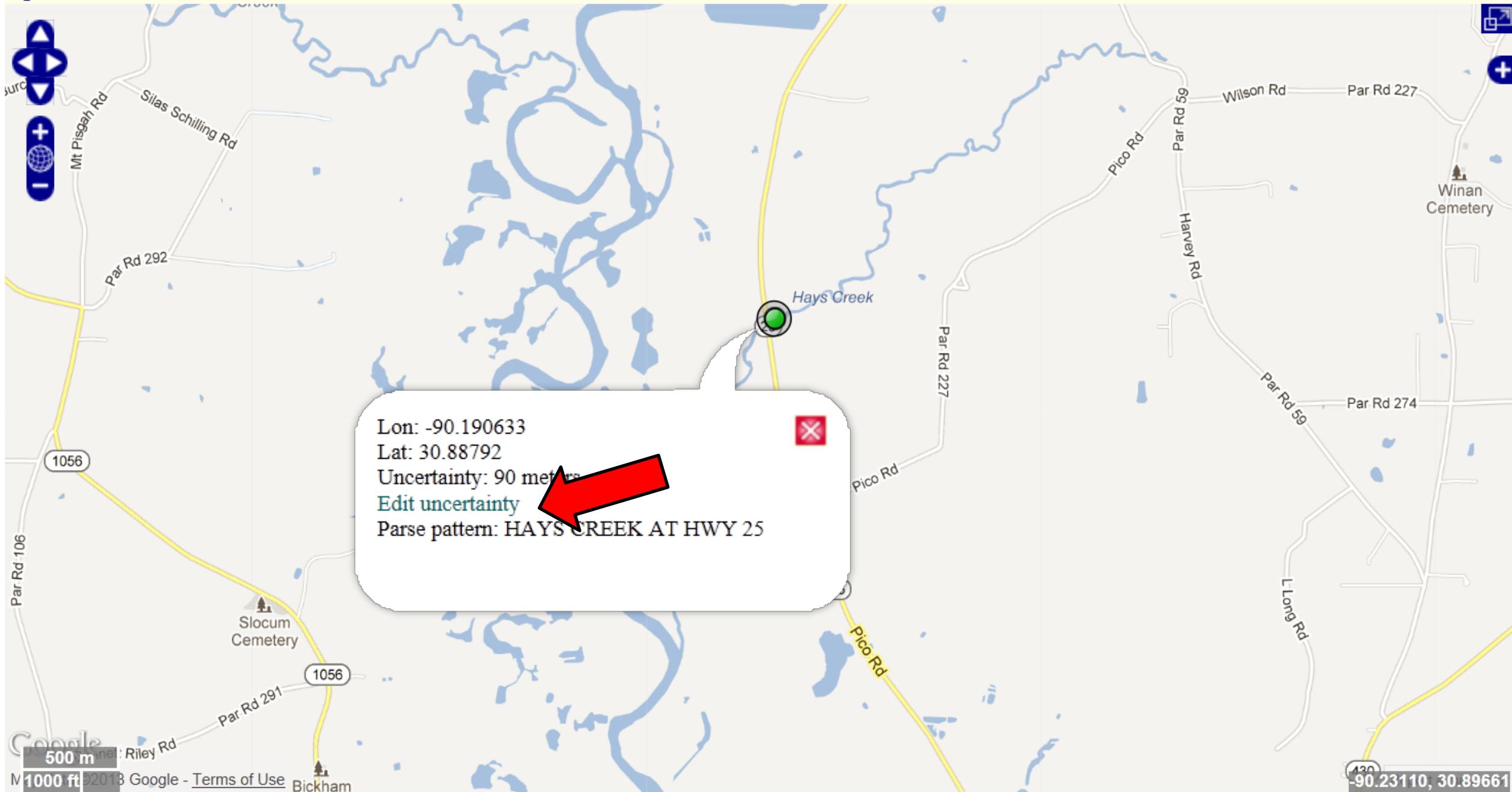
Washington



GEOLocate Web Application



1 possible location found.



Workbench

1 possible location found

Georeference

Options

Draw polygon

Place marker

Measure

Locality String: Hays Creek, 3 mi. n of Franklinton on hwy. 25

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error polygon

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30.88792

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Unavailable

County:

Washington

GeoLocate Workflow

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- Specify
- Symbiota
- Tropicos

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Batch Georeferencing



A topographic map showing contour lines and stream names like Spring Creek, Sharan Creek, and Mill Creek. A green dot marks a specific location, and a red arrow points to the '2 possible locations found' message in the Workbench.

Workbench 2 possible locations found

Show 8 records Page Georeference Georeference Options Correct | Draw polygon Place marker Measure

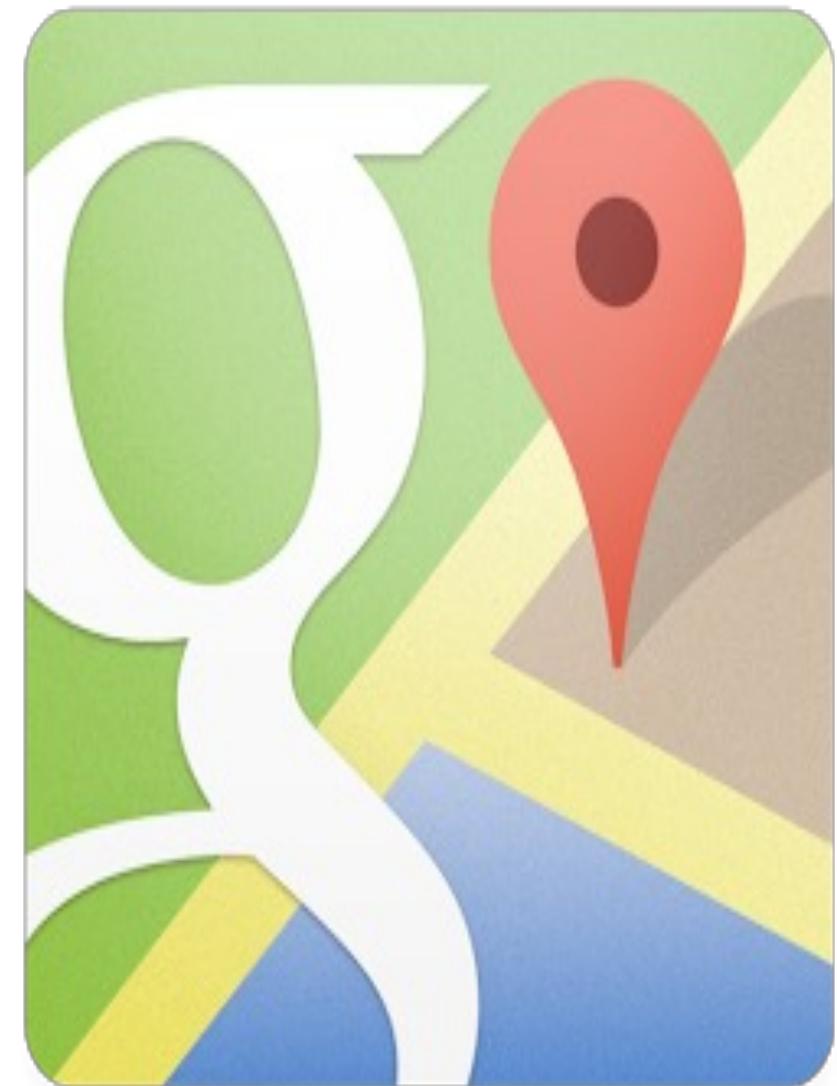
Locality	Country	StateProvince	County	Latitude	Longitude	Corrected	precision
Chambers Spring Road 2.5 km S of Hwy 412, 8.0 km E of Siloam Springs, T17N, R33W,	USA	Arkansas	Benton	36.188027	-94.451005	no	High(89)
Osage Creek, 1.0 mile N on gravel road to bridge crossing; gravel road jcts with	USA	Arkansas	Benton	36.189077	-94.395375	no	High(97)
Yocum Creek, near Oak Grove (Pass 11a), Sec. 30	USA	Arkansas	Carroll	36.454986	-93.322008	no	Low(35)
Village Creek State Park, S of driving range, Sec. 6	USA	Arkansas	Cross	35.16111	-90.70833	no	Low(39)
Sugar Creek, Hwy 163 at Bay Village, Sec. 4	USA	Arkansas	Cross	35.44909	-90.67533	no	High(100)
Buck Creek, 8.0 miles SE Corydon	USA	Indiana	Harrison	38.155118	-86.014724	no	High(88)
E Branch Mill Creek, Hessdale Road, 4.0 km S of Allendorph, Sec. 36	USA	Kansas	Wabaunsee	39.003564	-96.277745	no	High(88)
Blissdale Creek, Hillside National Wildlife Refuge, 500 m SW of Blissdale on Blis	USA	Mississippi	Holmes	33.083754	-90.224633	no	High(84)

Search: File management Noxinus_erythrogaster_Locations_MMN...

Showing 1 to 8 of 44 records

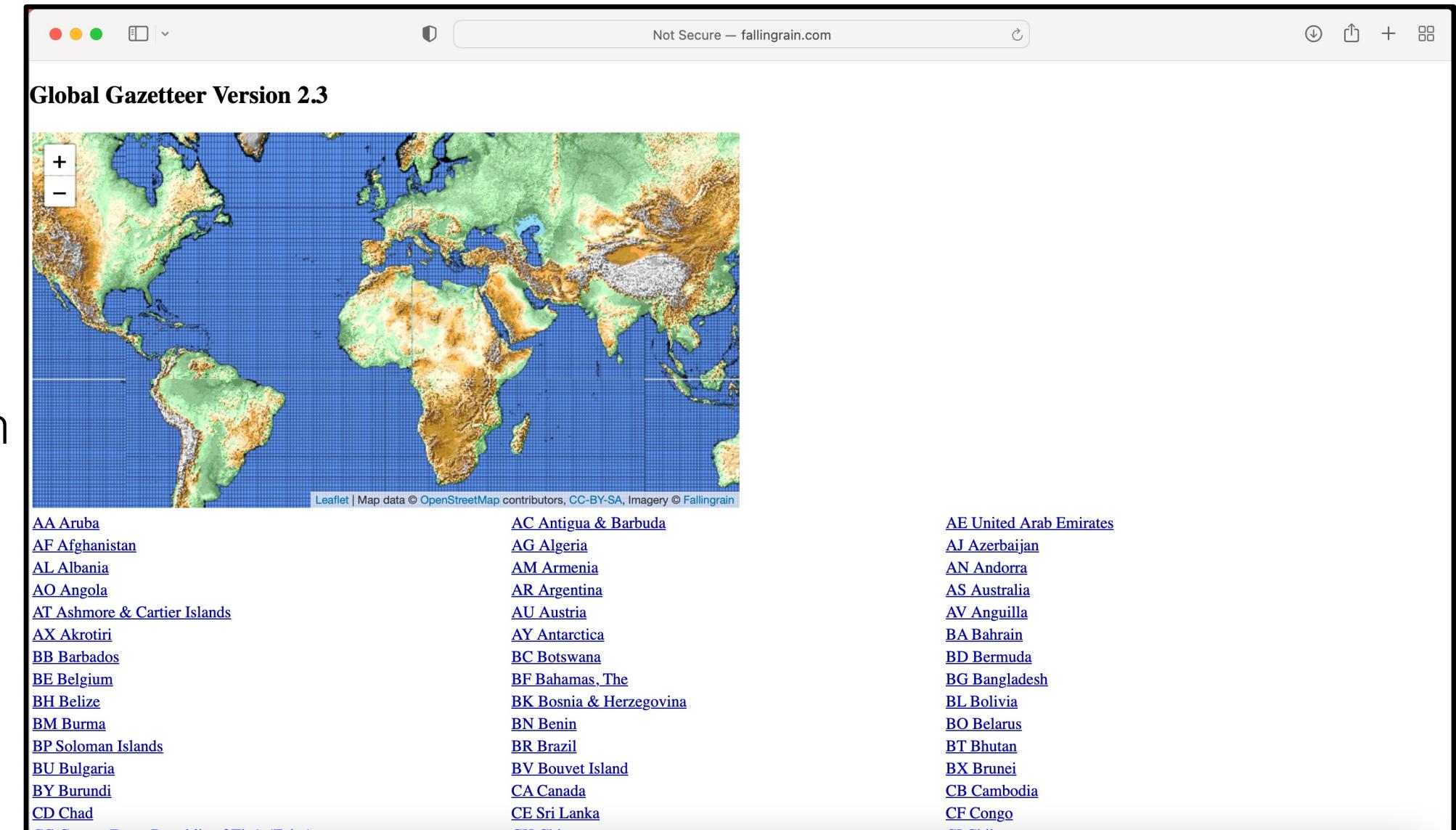
Google Maps

- **Search and directions**
 - Free text search
 - Directions for traveling by car, bike, public transportation, or foot
 - Data compiled from different sources
- **Maps**
 - Views: map, satellite, terrain, Google Street View
 - Sources of maps indicated at bottom



Falling Rain

- Worldwide gazetteer for cities and towns
- Great for **hard to find localities, especially outside US**
 - No search
 - Provides hierarchy, alternative names, altitude, weather information, and location of nearby towns
 - Example: Qaryeh-ye Gol'alam, Velayat-e Lowgar, AF



www.fallingrain.com

Getty Thesaurus of Geographic Names (TGN)

- Worldwide gazetteer by The Getty
- Useful for **alternative and old names**
 - Feature types
 - Geographical hierarchy
 - Degrees-minutes, not coordinates
 - Use recent name and search in Google Maps
- Example: New Amsterdam, US

The screenshot shows a web browser window displaying the Getty Thesaurus of Geographic Names (TGN) Full Record Display for the entity with ID 2132511. The page is titled "Full Record Display" and includes the following information:

- ID:** 2132511
- Page Link:** <http://vocab.getty.edu/page/tgn/2132511>
- Record Type:** administrative
- Hierarchical Position:**
 - World (facet)
 - ... North and Central America (continent) (P)
 - United States (nation) (P)
 - Ohio (state) (P)
 - Ross (county) (P)
 - New Amsterdam (deserted settlement) (P)
- Place Types:**
 - deserted settlement (preferred, C)
 - inhabited place (H)
- Sources and Contributors:**
 - Amsterdam..... [VP Preferred]
 - USGS, GNIS Digital Gazetteer (1994) GNIS39054403
 - New Amsterdam (P)

<http://bit.ly/Getty-TGN>

FuzzyG- JRC Fuzzy Gazetteer

- Worldwide gazetteer designed for **bad spelling**
- Critical for translating between languages
- Useful for finding **alternative, doubtful spelling, and old names**
 - Feature types, by continent
 - Degree-minutes, not coordinates
- Example: Nairobi instead of Nairobi, Africa

Results for narobi

You can interactively explore the area around a place with the map on the side. Click on 'See on map' to center the map on a place. Alternatively, you can see a place in [Google Earth](#) or in the [Digital Map Archive Explorer](#).

Open Google Earth	Nairobi, Nairobi Area, Kenya ★★★★☆
See on map	capital of a political entity
Coordinates (lat/long):	Decimal degrees: -1.2833332 / 36.8166667 Degrees, minutes, seconds: -11700 / 364900
Open Google Earth	Nairobi, Tanzania ★★★★☆
See on map	populated place
Coordinates (lat/long):	Decimal degrees: -4.9499999 / 38.9333333 Degrees, minutes, seconds: -45700 / 385600
Open Google Earth	Nabori, Ghana ★★★☆☆
See on map	populated place
Coordinates (lat/long):	Decimal degrees: 9.1111111 / 0.0 Degrees, minutes, seconds: 5166666 / 0
Open Google Earth	Narobé, Burkina Faso ★★★☆☆
See on map	populated place
Coordinates (lat/long):	Decimal degrees: 12.0 / 0.0 Degrees, minutes, seconds: 720000 / 0

Leave results on map for next search

Map Satellite Hybrid Terrain

Ruanda
Is
Ile
Maituru
Mahagi
Amuria
Mbale
Kitale
Eldoret
Kampala
Bunia
Ngeleza
Tingba
Butembo
Isango-Isoro
Basisi
Uganda
Adusa
Lambasa
Turi
Udu
Nyeri
Nairobi
Niguluni
Karagite
Olruone
Arime
Musoma
Mwanza
Serengeti National Park
Tsavo East National Park
Maswa Game Reserve
Kigosi Game Reserve
Burundi
Uvira
Bukavu
Ikundu
Mwata
Mwana
Usang
Mombasa
Arusha
Moshi
Usang
Mombasa

Georeferencing Quick Reference Guide

GEOREFERENCING QUICK REFERENCE GUIDE

Version: 2012-10-08

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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 [6]. Geocodes and coordinates and spatial boundaries for places can be found. This guide follows the "Georeferencing for Dummies" [6], and explains the recommended calculations and localities encountered in the georeferencing process.

Georeferences using the methods in this guide will be maximally accurate. As much information as possible is captured about and during the georeferencing process. The following fields defined in the Darwin Core standard [7]. For a detailed 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 of the georeference.
- **coordinateUncertaintyInMeters** – The horizontal distance (in meters) from the **decimalLatitude** and **decimalLongitude** describing the smallest circle that encloses the whole of the Location. Leave the value empty if the uncertainty is unknown, cannot

<https://docs.gbif.org/georeferencing-quick-reference-guide/1.0/en/>

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Version 7adb86d, 2021-02-01 17:30:10 UTC

Other Tools: Visualizing Data

GPS Visualizer

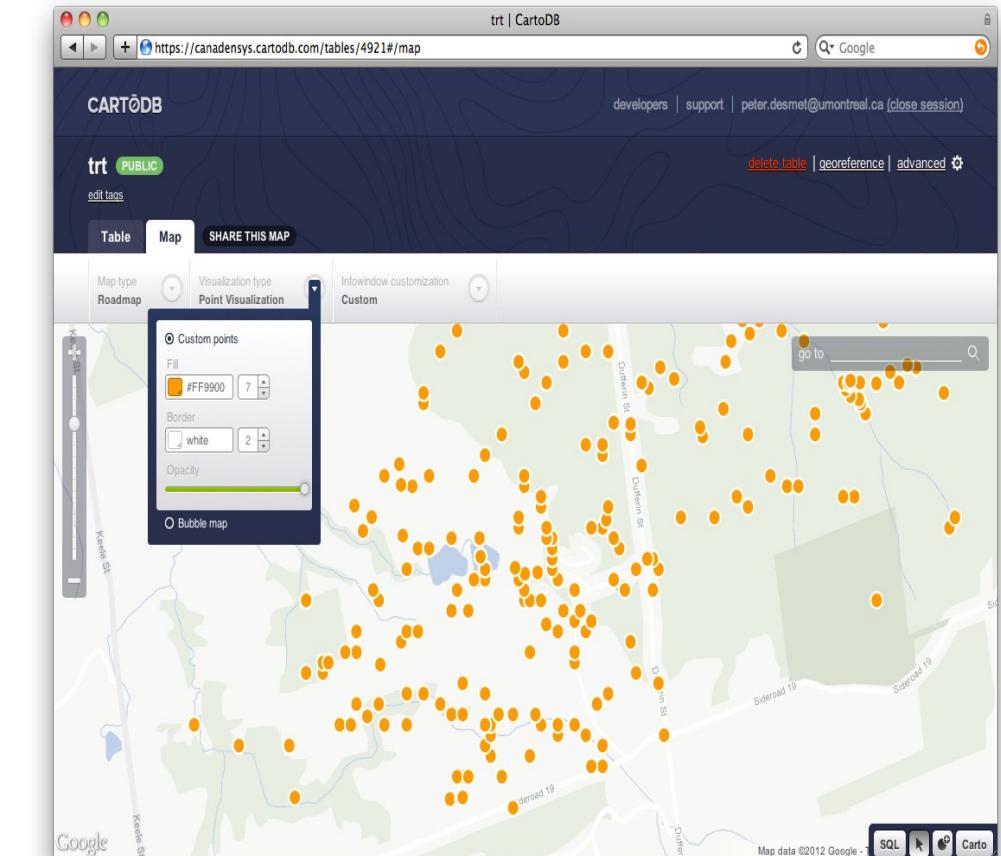
- Use to translate a file with coordinates into kml or a map

Carto

- Online geospatial database
- Drag and drop CSV upload
- Easy customization of map
- Share and embed map
- Powerful development tools



<http://www.gpsvisualizer.com/>



Links with links



<https://www.idigbio.org/wiki/index.php/Georeferencing>

<http://herpnet.org/Gazetteer/GeorefResources.htm>



GEOLocate Practice

- Instruction sheet

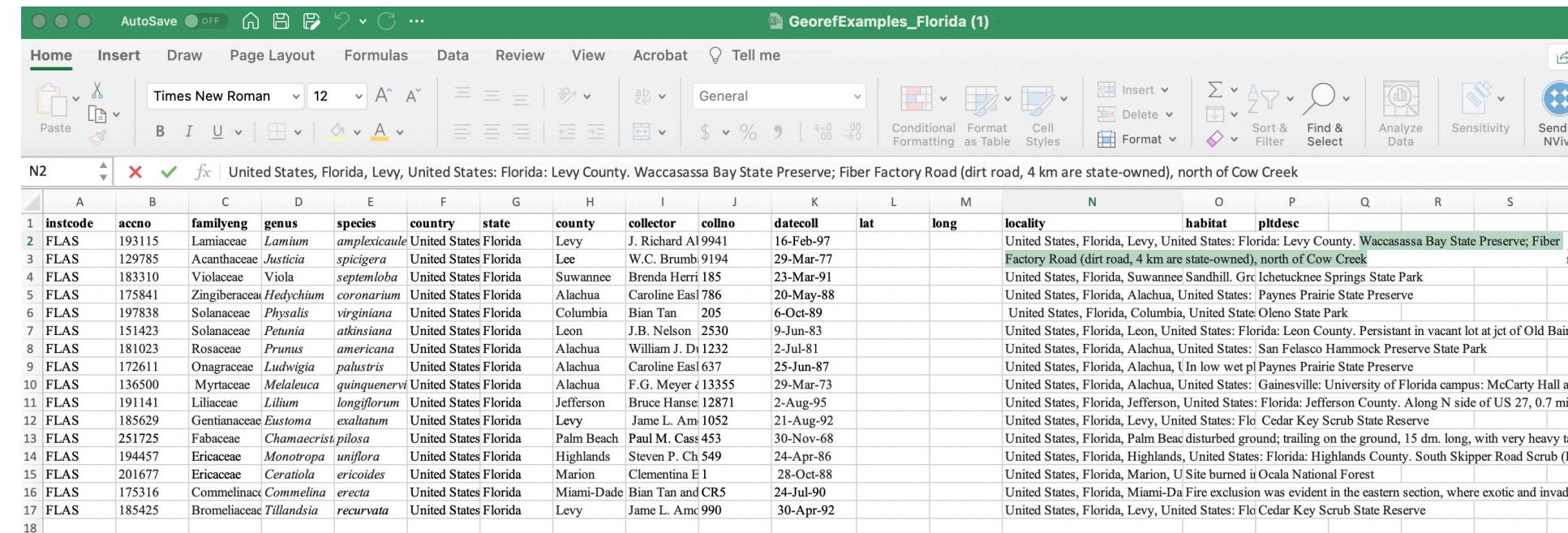
Georeferencing Demo

Resources:

GeoLocate: <http://www.museum.tulane.edu/geolocate/web/default.html>
GeoLocate – Web application: <http://www.geo-locate.org/web/WebGeoref.aspx>
Google Maps: <https://www.google.com/maps>
Falling Rain: <http://www.fallingrain.com>
Getty Thesaurus of Geographic Names (TGN): <http://bit.ly/Getty-TGN>
Fuzzy Gazetteer: <http://dma.jrc.it/services/fuzzyg/>

1. Use the **standard** GeoLocate client to identify the first three localities in the GeorefExamples_Florida.xls file.
 - a. Enter the locality string, country, state, and county information from the Excel sheet.

- Excel sheet with localities



A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
instcode	accno	familyeng	genus	species	country	state	county	collector	colno	datecoll	lat	long	locality	habitat	ptdesc			
1 FLAS	193115	Lamiaceae	Lamium	amplexicaule	United States	Florida	Levy	J. Richard Al	9941	16-Feb-97			United States, Florida, Levy, United States: Florida: Levy County. Waccasassa Bay State Preserve; Fiber					
2 FLAS	129785	Acanthaceae	Justicia	spicigera	United States	Florida	Lee	W.C. Brumb	9194	29-Mar-77			Factory Road (dirt road, 4 km are state-owned), north of Cow Creek					
3 FLAS	183310	Violaceae	Viola	septemloba	United States	Florida	Suwannee	Brenda Herri	185	23-Mar-91			United States, Florida, Suwannee Sandhill. Grc Ichetucknee Springs State Park					
4 FLAS	175841	Zingiberaceae	Hedychium	coronarium	United States	Florida	Alachua	Caroline Easl	786	20-May-88			United States, Florida, Alachua, United States: Paynes Prairie State Preserve					
5 FLAS	197838	Solanaceae	Physalis	virginiana	United States	Florida	Columbia	Bian Tan	205	6-Oct-89			United States, Florida, Columbia, United States: Olem State Park					
6 FLAS	151423	Solanaceae	Petunia	atkinsiana	United States	Florida	Leon	J.B. Nelson	2530	9-Jun-83			United States, Florida, Leon, United States: Florida: Leon County. Persistent in vacant lot at jct of Old Bain					
7 FLAS	181023	Rosaceae	Prunus	americana	United States	Florida	Alachua	William J. D	1232	2-Jul-81			United States, Florida, Alachua, United States: San Felasco Hammock Preserve State Park					
8 FLAS	172611	Onagraceae	Ludwigia	palustris	United States	Florida	Alachua	Caroline Easl	637	25-Jun-87			United States, Florida, Alachua, In low wet pl Paynes Prairie State Preserve					
9 FLAS	136500	Myrtaceae	Melaleuca	quinquenervia	United States	Florida	Alachua	F.G. Meyer	13355	29-Mar-73			United States, Florida, Alachua, United States: Gainesville: University of Florida campus: McCarty Hall a					
10 FLAS	191141	Liliaceae	Lilium	longiflorum	United States	Florida	Jefferson	Bruce Hanse	12871	2-Aug-95			United States, Florida, Jefferson, United States: Florida: Jefferson County. Along N side of US 27, 0.7 mi					
11 FLAS	185629	Gentianaceae	Eustoma	exaltatum	United States	Florida	Levy	Jame L. Am	1052	21-Aug-92			United States, Florida, Levy, United States: Flo Cedar Key Scrub State Reserve					
12 FLAS	251725	Fabaceae	Chamaecrista	pilosa	United States	Florida	Palm Beach	Paul M. Cass	453	30-Nov-68			United States, Florida, Palm Beac disturbed ground; trailing on the ground, 15 dm long, with very heavy t					
13 FLAS	194457	Ericaceae	Monotropa	uniflora	United States	Florida	Highlands	Steven P. Ch	549	24-Apr-86			United States, Florida, Highlands, United States: Florida: Highlands County. South Skipper Road Scrub (
14 FLAS	201677	Ericaceae	Ceratiola	ericoides	United States	Florida	Marion	Clementina E	1	28-Oct-88			United States, Florida, Marion, U Site burned i Ocala National Forest					
15 FLAS	175316	Commelinaceae	Commelinia	erecta	United States	Florida	Miami-Dade	Bian Tan and CR5		24-Jul-90			United States, Florida, Miami-Da Fire exclusion was evident in the eastern section, where exotic and invad					
16 FLAS	185425	Bromeliaceae	Tillandsia	recurvata	United States	Florida	Levy	Jame L. Am	990	30-Apr-92			United States, Florida, Levy, United States: Flo Cedar Key Scrub State Reserve					