

Collaborative Georeferencing Experiences

Nelson Rios

Yale Peabody Museum

FishNet Then...

FishNet

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Funded by:

[The National Science Foundation Grant DEB-9985737](#)

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FishNet

Updated 13 Nov 2003

What is FishNet?

Fishnet is a "distributed information system" that uses Z39.50 and XML protocols to link together the specimen records of museums and other institutions in a seamless information-retrieval system. Using Fishnet and The Species Analyst (TSA), anyone with access to the Internet can query the databases of Fishnet Partners and obtain a variety of information about the fishes that are in the database. Since all partners are natural history museums, each record is associated with one or more fish specimens.

Fishnet differs from more centralized databases in several important respects. First, the information is **distributed**. This means that the databases are located at Partner Institutions and they retain full control over what information they make available to Fishnet. Second, Partner Institutions are **constantly updating** and adding to their records and this new information is available via Fishnet on a daily or weekly basis. Third, users can download parts of the databases in a variety of formats and analyze this information on their own computers.

Fishnet is an outgrowth of the extension of The Species Analyst system to the fish world. At present, there are 24 partner institutions. Twelve of these collections are currently connected online, and provide access to 20 million specimens in over 1 million lots. Other partners will be added, with completion date of the original network scheduled for December 2002.



Centropyge heraldi, Vanuatu. Photo by Dr. J. T. Williams, @ Smithsonian Institution

Home Species Analyst

Species Analyst

Author: Dave Vieglais
Revision: 1.6
Date: 2003-06-30

The Species Analyst is a research project developing standards and software tools for access to the world's natural history collection and observation databases. The Species Analyst project is based at the [University of Kansas Natural History Museum and Biodiversity Research Center](#).

There are currently over 120 natural history collection databases being served through the Species Analyst Network, with collections located all over the world. All of these collections may be searched simultaneously through the Species Analyst, with the combined information returned to you in one of a variety of formats.

The original, and currently dominant form of the Species Analyst network is based on the ANSI/NISO Z39.50 standard for information retrieval. DiGIR, a replacement for Z39.50, is being actively developed by a number of developers including the creator of the Species Analyst network, and will gradually replace the Z39.50 infrastructure over time.

The Species Analyst project has given rise to, or provides the technical infrastructure for a number of other projects including:

- FishNet
- MaNIS (the first full DiGIR implementation)
- HerpNet (following on from MaNIS)
- Canadian Biodiversity Information Facility
- Global Biodiversity Information Facility (using DiGIR as the primary information retrieval protocol)

© 1998-2004

View document source. Generated on: 2004-02-04 21:02 UTC. Generated by Docutils from reStructuredText source.

est.1999

Powered By **DiGIR**

[FishNet2 Home](#) : Portal Home

Select type of network query

- View specimen records
- View taxonomic index
- View geographic index
- View taxonomy by geography index
- View gazetteer

est.1999

est. 2005

Search FishNet:

[-] Click to minimize Text Search Fields

Taxon:

Date Range (yyyy-yyyy):

Location: >>

Other:

Institution Code and/or Catalog Number: >>

Search Polygon (Paste WKT or select from menu): >>
 POLYGON((-58.1903271684685 -34.22562225286274 -57
 You may use the map below to draw a polygon.
 Doing so will populate this field.

[-] Click to minimize Map

Instructions:
 (1) Navigate to your location on the map; (2) check 'Draw Search Polygon' (below);
 (3) click on the map to draw your polygon; (4) double-click on your last point to finish drawing.
 Note that the Search Polygon field (above) will be populated with WKT representing your polygon.
 The results from your query will not be plotted on the map. Use the KML link (below results) to view in Google Earth.

Draw Search Polygon

Execute Query

...FishNet Now

- Centralized, data aggregator model
- 75 data providers
- 4.2 million lots (40+ million spms)
- Data harvester supports: DiGIR, DwC, IPT, TAPIR, CSV, TSV, TXT
- Streamlined interface
- Synonym & common name resolution
- Institutional, Taxonomic, Temporal, Geographic and Full Text searching.
- Spatial Indexing allows complex geographic queries

Search Results:

Occurrence records found: 540

Occurrence records with coordinates: 540

Search Results Taxon Providers & Citation Location Plot geo-coded results [+] Search Query Link

InstitutionCode	CollectionCode	CatalogNumber	IndividualCount	ScientificName	Family	PreparationType	Tissues	Latitude	Longitude	CoordinateUncertaintyInMeters	HorizontalDatum	Country	StateProvince	County	Island	IslandGroup	Locality
UMMZ	FISH	218599	10	Brevoortia pectinata	Clupeidae			-34.66666667	-54.28333333			Uruguay	Rocha				Laguna de Rocha, app. 1.5 km from 'barra' (mout
UMMZ	FISH	218600	2	Stellifer brasiliensis	Sciaenidae			-34.66666667	-54.28333333			Uruguay	Rocha				Laguna de Rocha, app. 1.5 km from 'barra' (mout
UMMZ	FISH	218601	1	Mugil sp.	Mugilidae			-34.66666667	-54.28333333			Uruguay	Rocha				Laguna de Rocha, app. 1.5 km from 'barra' (mout
UMMZ	FISH	218602	20	Odontesthes argentinensis	Atherinidae			-34.66666667	-54.28333333			Uruguay	Rocha				Laguna de Rocha, app. 1.5 km from 'barra' (mout
UMMZ	FISH	218603	1	Cyphocharax gilberti	Curimatidae			-34.66666667	-54.28333333			Uruguay	Rocha				Laguna de Rocha, app. 1.5 km from 'barra' (mout
UMMZ	FISH	218604	8	Oligosarcus macrolepis	Characidae			-34.66666667	-54.28333333			Uruguay	Rocha				Laguna de Rocha, app. 1.5 km from 'barra' (mout
UMMZ	FISH	231948	2	Odontesthes argentinensis	Atherinidae			-34.91666667	-56.23333333			Uruguay	Montevideo				Montevideo Bay, Escollera Sarandi, Montevideo
UMMZ	FISH	231978	6	Odontesthes argentinensis	Atherinidae			-34.91666667	-56.23333333			Uruguay	Montevideo				Montevideo port, Escollera Sarandi, Montevideo
UMMZ	FISH	231980	1	Odontesthes argentinensis	Atherinidae			-34.91666667	-56.23333333			Uruguay	Montevideo				Puerto Montevideo, Escollera Sarandi, Montevide
UMMZ	FISH	231981	3	Odontesthes argentinensis	Atherinidae			-34.91666667	-56.23333333			Uruguay	Montevideo				Montevideo, Rio de la Plata drainage
UMMZ	FISH	233274	3	Odontesthes retropinnis	Atherinidae			-34.91666667	-56.06666667			Uruguay	Canelones				Arroyo Canelon Grande (Cantera), Rio Santa Luc
UMMZ	FISH	233275	3	Odontesthes bonariensis	Atherinidae			-34.83333333	-55.08333333			Uruguay	Maldonado				Laguna del Sauce, Rio del Sauce _> Rio de la Pl
UMMZ	FISH	233280	3	Odontesthes bonariensis	Atherinidae			-34.83333333	-55.08333333			Uruguay	Maldonado				Laguna del Sauce
MNHN	IC	b-0799	2	Exocoetus volitans	Exocoetidae			-34.917	-56.167			UY					
MNHN	IC	1992-1411	1	Symphurus trewavasae	Cynoglossidae			-35	-55			UY					

Project Goals

Expand the number of records within FishNet to approximately 4 million lots representing over 30 million specimens

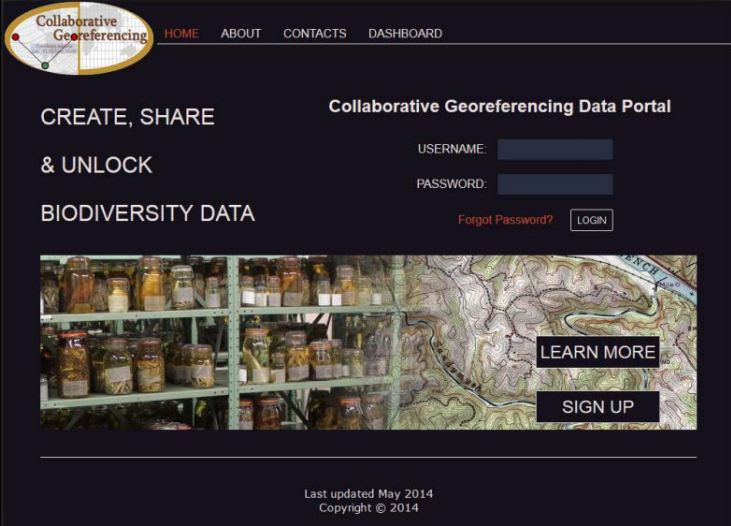
Georeference the "georeferencable" records lacking geographic coordinates (approx. half of Fishnet)

Repatriate results to source data providers

Evaluate volunteer vs technician contributions

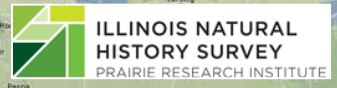
Georeferencing Details

- 250,000 collecting events
- 18 months
- 12 full time technicians
- Student volunteers
- Collaborative Georeferencing

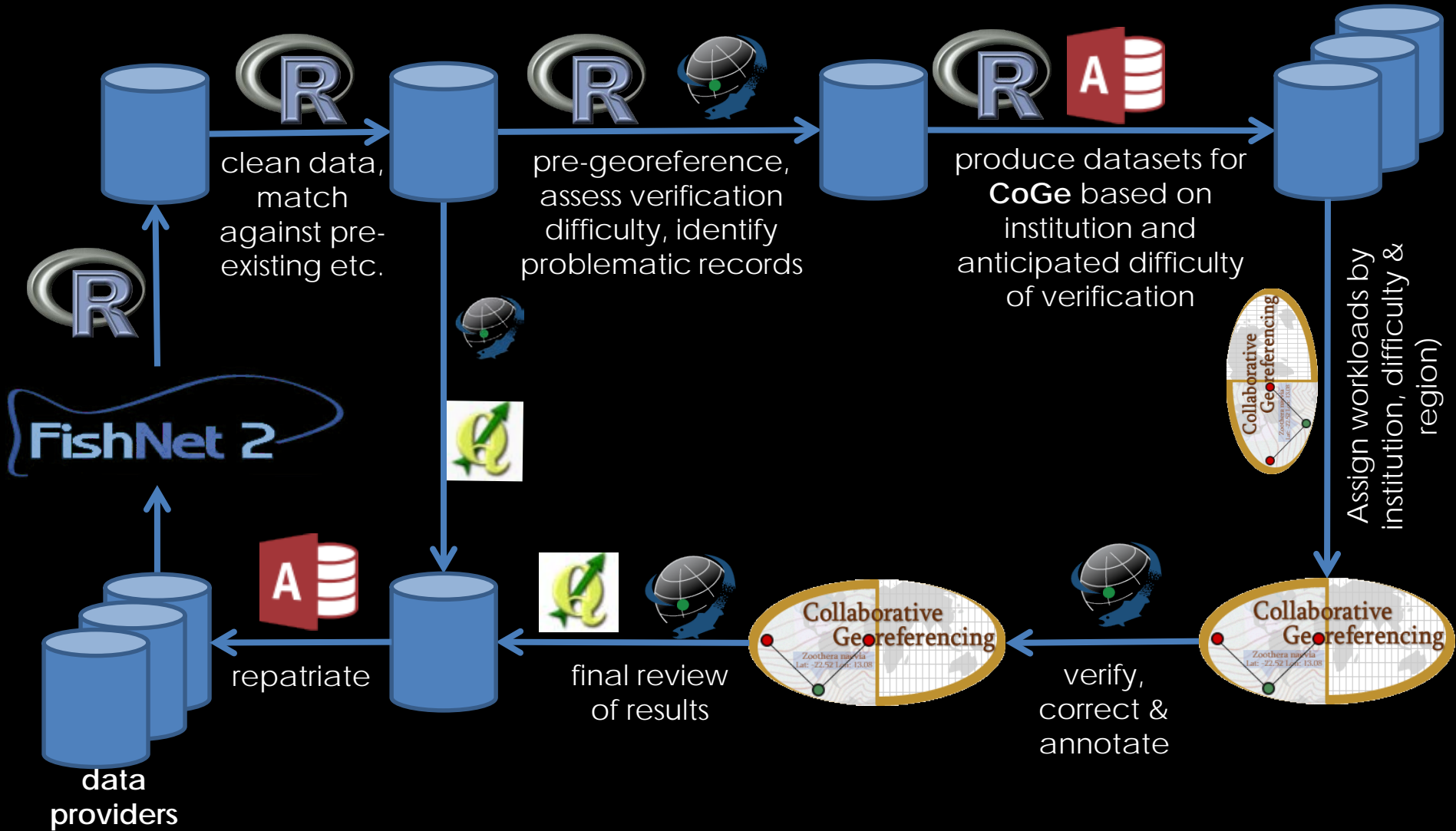


The screenshot shows the homepage of the Collaborative Georeferencing Data Portal. At the top left is the logo, and to its right are navigation links for HOME, ABOUT, CONTACTS, and DASHBOARD. The main content area features the text "CREATE, SHARE & UNLOCK BIODIVERSITY DATA" on the left and a login section on the right with fields for USERNAME and PASSWORD, a "LOGIN" button, and a "Forgot Password?" link. Below this is a banner image showing jars of specimens on shelves next to a topographic map, with "LEARN MORE" and "SIGN UP" buttons overlaid. At the bottom right, it says "Last updated May 2014 Copyright © 2014".

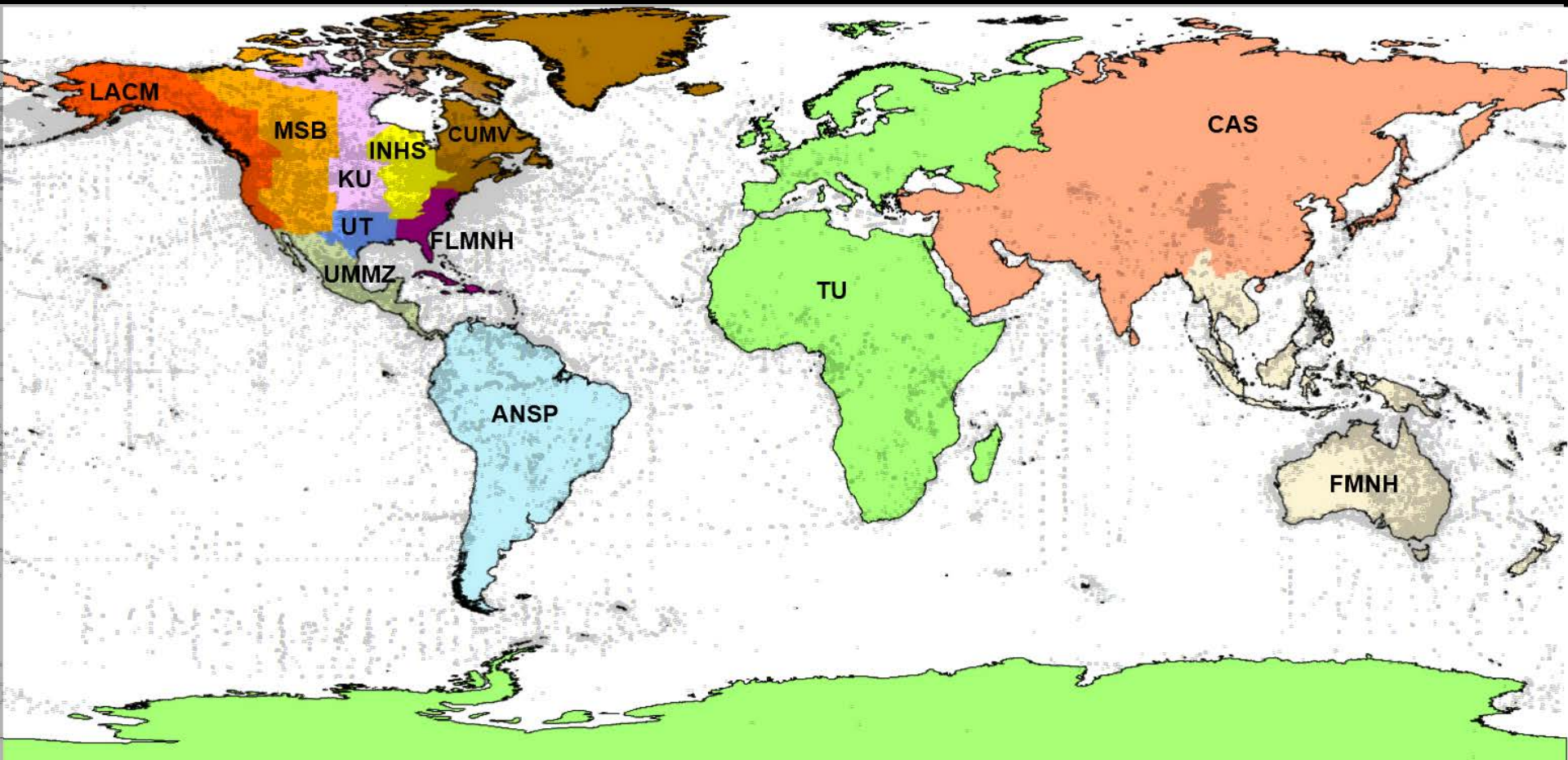
Collaborators



Methods



Preliminary Assignments



1.6 million lots in need of georeferencing
321,102 locality records (250K proposed)

Collaborative Georeferencing HOME ABOUT CONTACTS DASHBOARD Nelson Rios (LOG OUT)

FishNet 2

DATA SOURCES MEMBERS SNAPSHOT SETTINGS

Data source management operations

- Add new community data source via CSV files

Click on an item's header to expand/collapse its content. sort by date ^

community-wide

Community Owner: you

Community description: Collaborative georeferencing of data from FishNet 2

Number of community data sources: 168

Records statistics:

Specimens: 1,302,853

Corrected: 1,122,421

Skipped: 122,175

Total processed: 1,244,596

VIEW RECORDS

DOWNLOAD RECORDS

Localities: 289,412

Corrected: 244,749

Skipped: 35,118

Total processed: 279,867

lowa_with_county	date added: Monday, January 07, 2013	delete
Maine_with_county	date added: Monday, January 07, 2013	delete
Minnesota_with_county	date added: Monday, January 07, 2013	delete
Montana_with_county	date added: Monday, January 07, 2013	delete

Georeferencing

- GEOLocate Collaborative Georeferencing (CoGe) framework.**
- Each record was automatically georeferenced, evaluated by project technicians and either corrected or skipped to produce a final result.**
- Skipped records represent those records lacking sufficient information for adequate georeferencing by a technician.**
- Technicians were asked to provide comments on each skipped record, explaining why the record was skipped.**

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

GEOLocate Collaborative Georeferencing Web Client

1 possible location found.

Workbench

1 possible location found History Review

Community: FishNet 2

Clear Polygon Draw polygon Place marker Measure

Next Record(s): **Luggar Landing, West Pearl River, Stardling, United States, Louisiana;**

Correct: *F.M.D./H14004 Fundulus chrysotus*

Skip Selected: Similar Records(5)

Add Comments: Luggar Landing, West Pearl River near Stardling, United States, Louisiana; ;

Clear Workbench: West Pearl River, Stardling, Luggar Landing, Deer Island, United States, Louisiana; ;

Correction Report: Luggar Landing, West Pearl River, near Stardling, United States, Louisiana; ;

Logout | logged in as nelson

Calculated Coordinates

Lat: 30.229134

Lon: -89.668154

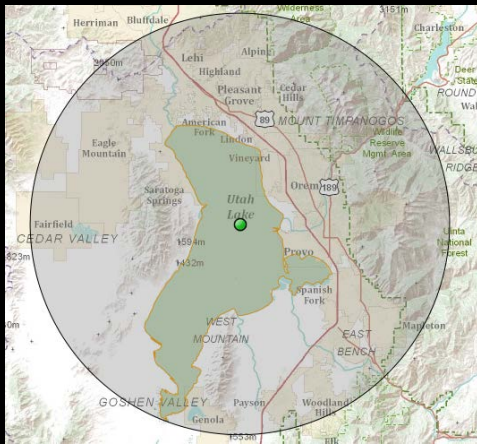
U. Radius: 581 m

Manual Edit

Georeferencing

Each corrected record minimally contains a corrected latitude/longitude and a radius of uncertainty in meters.

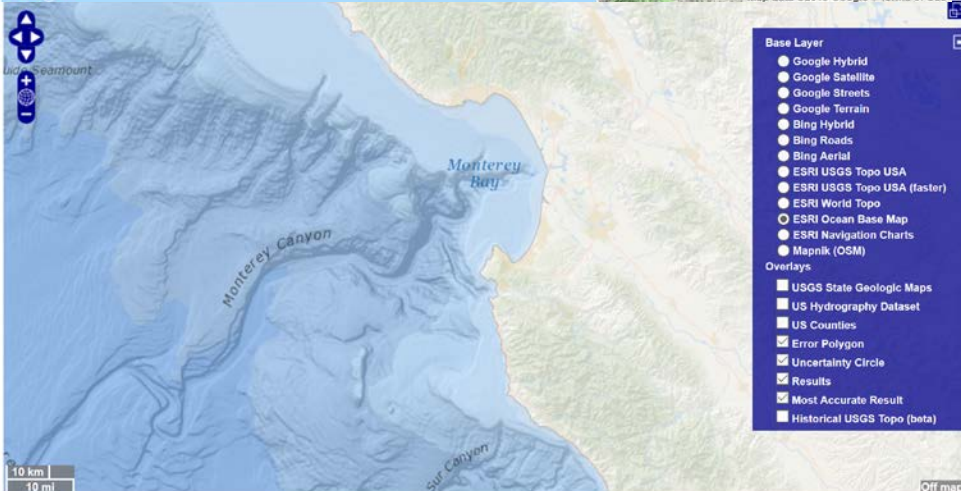
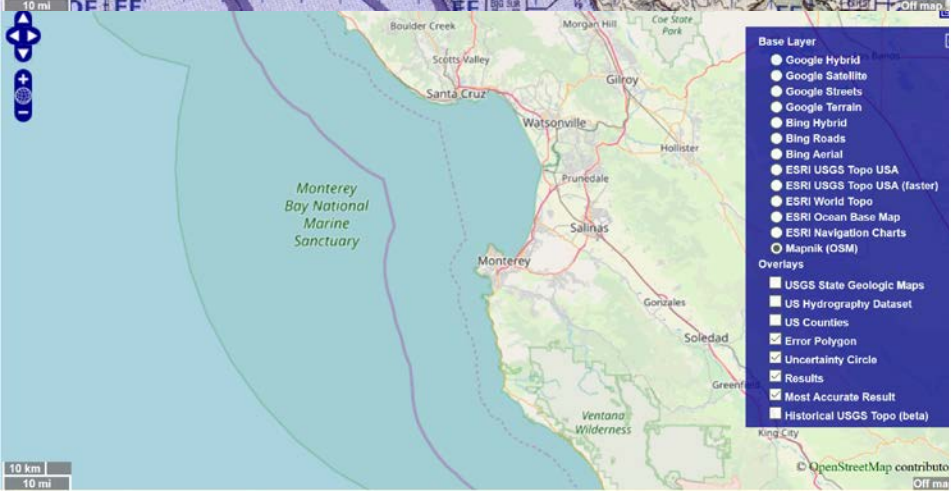
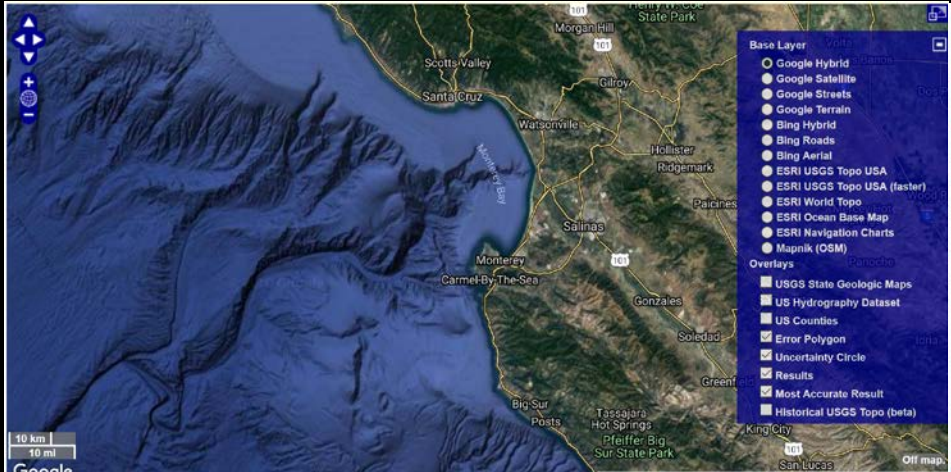
Additionally, technicians were encouraged to specify polygons (for example along the courses of rivers) to further refine the level of uncertainty anytime the uncertainty radius significantly overestimated uncertainty.



Polygons

about 85% of the corrections included user-generated polygons





Similarity Matching

1 possible location found History Review

Community: FishNet 2 | Draw polygon Place n

Luggar Landing, West Pearl River, Starlding; United States; Louisiana; ;

FMNH14004 Fundulus chrysotus

Similar Records(5)

- Luggar Landing, West Pearl River near Starlding; United States; Louisiana; ;
- West Pearl River, Starlding, Luggar Landing, Deer Island; United States; Louisiana; ;
- Luggar Landing, West Pearl River, near Starlding; United States; Louisiana; ;

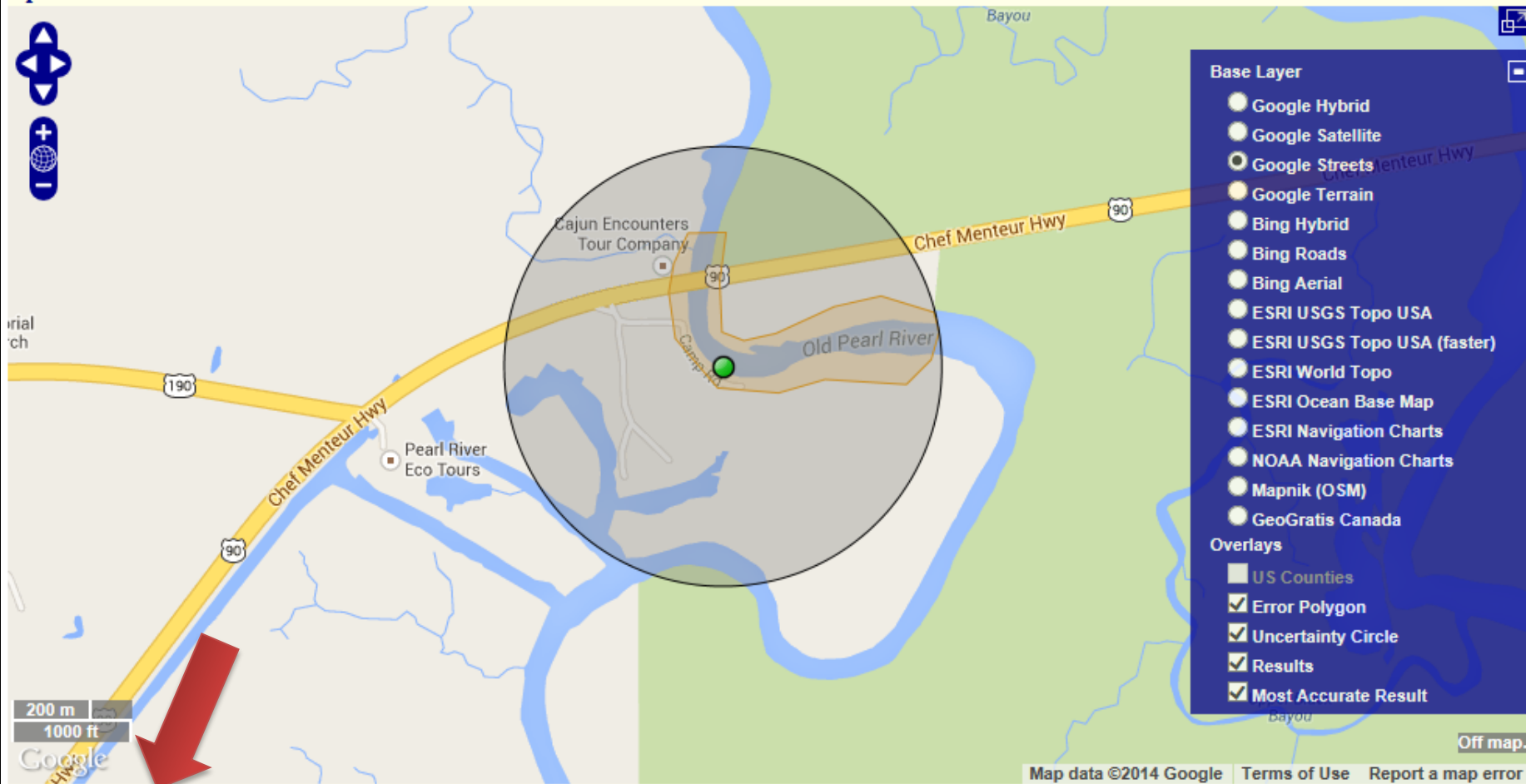
Luggar Landing, West Pearl River, near Starlding; United States; Louisiana; ;

West Pearl River, Starlding, Luggar Landing, Deer Island; United States; Louisiana; ;

GEOLocate Collaborative Georeferencing Web Client



1 possible location found.



Workbench

1 possible location found

History

Review

Community: FishNet 2

Draw polygon
 Place marker
 Measure

- Next Record(s)
- Correct
- Skip Selected
- Add Comments
- Clear Workbench
- Correction Report

- Luggar Landing, West Pearl River, Starlding; United States; Louisiana; ;**
- FMNH14004 Fundulus chrysotus*
- Similar Records(5)
- Luggar Landing, West Pearl River near Starlding; United States; Louisiana; ;
- West Pearl River, Starlding, Luggar Landing, Deer Island; United States; Louisiana; ;
- Luggar Landing, West Pearl River, near Starlding; United States; Louisiana; ;

Logout | logged in as nelson

Calculated Coordinates

Lat: 30.229134
 Lon: -89.668154
 U. Radius: 581 m

GEOLocate Collaborative Georeferencing Web Client



1 possible location found.

Workbench | 1 possible location found | History | Review

Manage History

show records

Options

get skipped

get corrected

...get previous set...

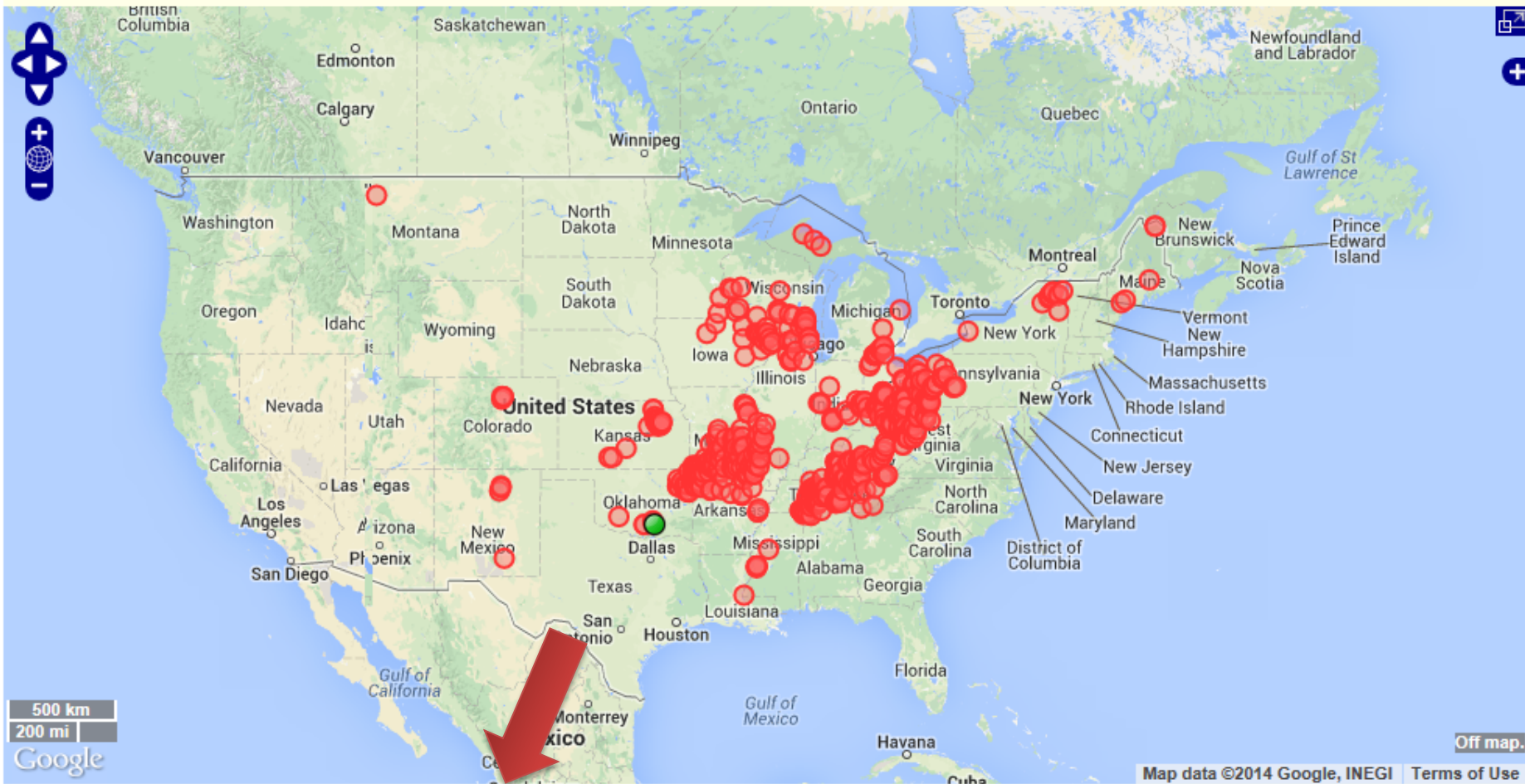
- *corrected on 9/10/2013 4:17:36 pm* Avery Island.; United States; Louisiana; Iberia;
- *corrected on 9/10/2013 4:17:36 pm* Avery Island.; United States; Louisiana; Iberia;
- *corrected on 9/10/2013 4:14:36 pm* Lake Providence, South Shore; 6 to 12 inches in depth; sand bottom; United States; Louisia
- *corrected on 9/10/2013 4:13:59 pm* Lake Providence; United States; Louisiana; East Carroll;**
- *corrected on 9/10/2013 4:11:19 pm* Meridian Cr. on LA 348, 1 mi. E of Conway; T22N-R1W-Sec.17; United States; Louisiana;
- *corrected on 9/10/2013 4:09:59 pm* Tickfaw R., 0.5 mi. W of Holden on US 190; United States; Louisiana; Livingston;

Options

include localities with matching determination

exclude outdated determinations

GEOLocate Collaborative Georeferencing Web Client



Off map.

Map data ©2014 Google, INEGI Terms of Use

Workbench Results History **Review**

Active Related

1 collecting event at that location.

Reviewing records for scientific name 'PHOXINUS

ERYTHROGASTER'. Edit...

Comments:

Blue River Prosper 1 mi E of St Rte 99 & Connerville.; United States; Oklahoma; Johnston

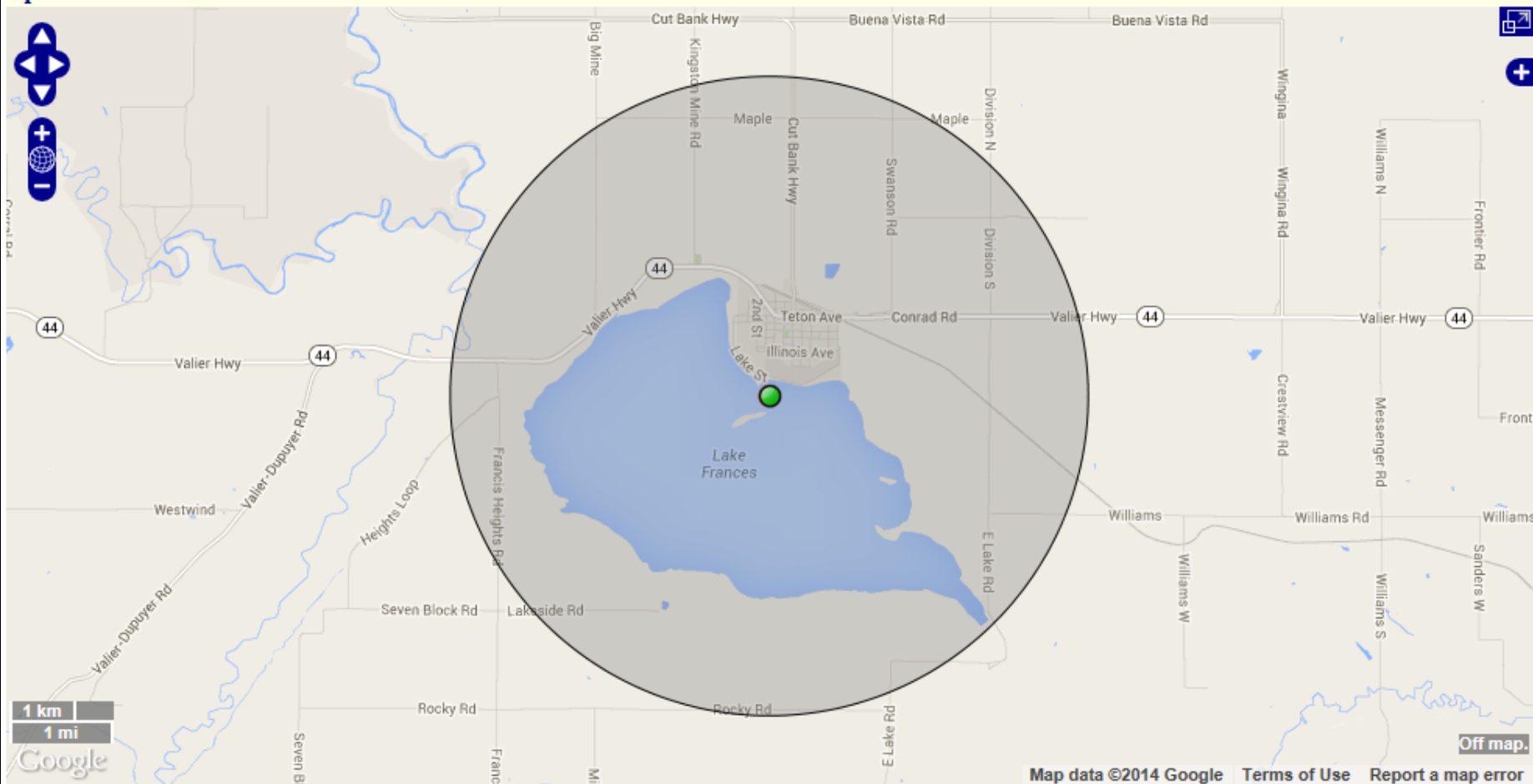


move to workbench

GEOLocate Collaborative Georeferencing Web Client



1 possible location found.



Workbench 1 possible location found History Review

Community: FishNet 2

Draw polygon Place marker Measure

- Next Record(s)
- Correct
- Skip Selected
- Add Comments
- Clear Workbench
- Correction Report

<input type="checkbox"/>	LAKE FRANCES, 5 MI. W OF VALIER, IRRIGATION DITCH FEEDS THE LAKE AND FLOWS OUT OF
<input type="checkbox"/>	UWFCUW 002716 CATOSTOMUS CATOSTOMUS
<input type="checkbox"/>	UWFCUW 002717 CATOSTOMUS COMMERSONI
<input type="checkbox"/>	UWFCUW 002719 COUESIUS PLUMBEUS
<input type="checkbox"/>	UWFCUW 002715 ONCORHYNCHUS CLARKII

Logout | logged in as nelson

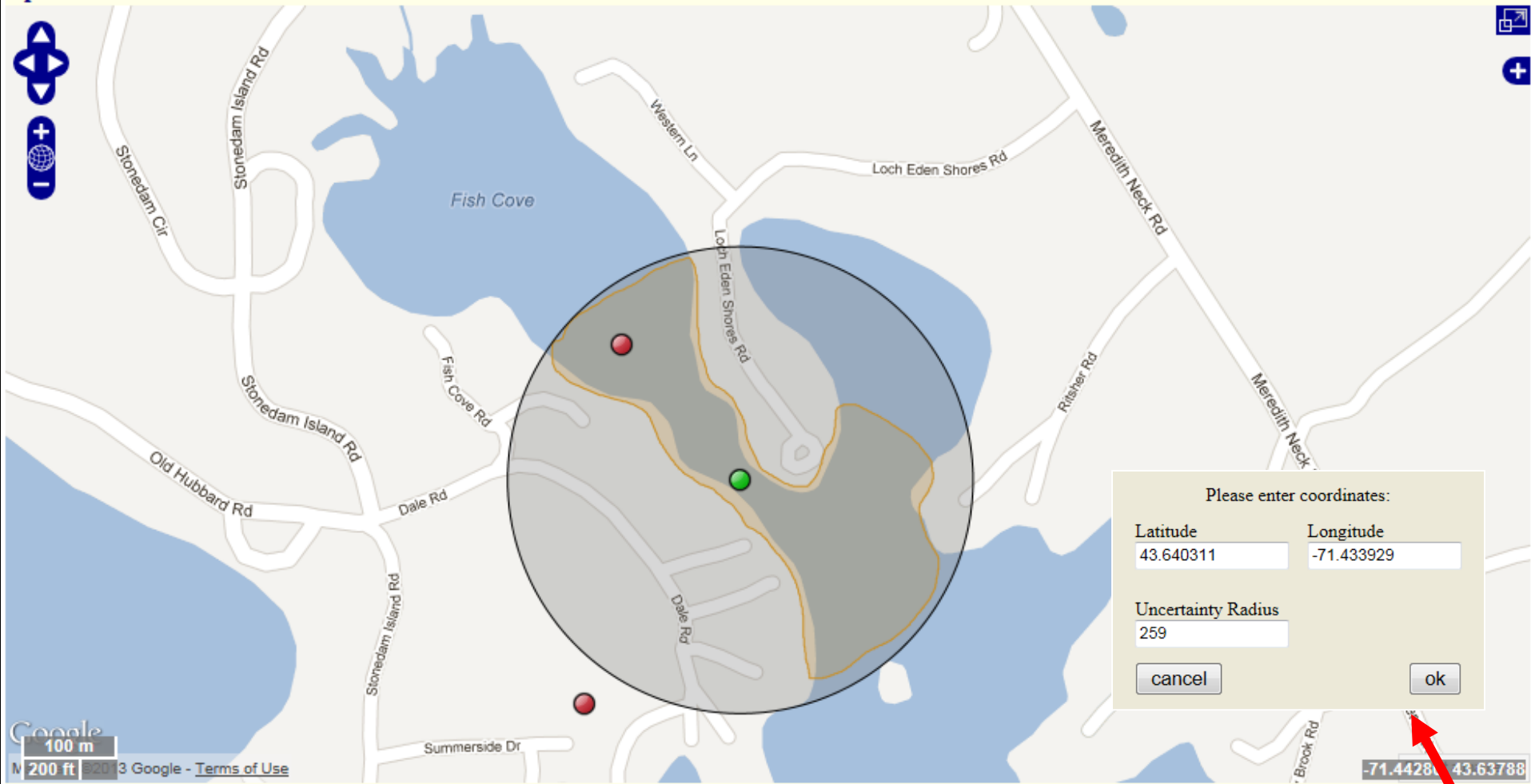
Calculated Coordinates

Lat: 48.296377
 Lon: -112.255363
 U. Radius: 5214 m

Manual Edit



6 possible locations found.



Please enter coordinates:

Latitude	Longitude
43.640311	-71.433929
Uncertainty Radius	
259	
cancel	ok

Workbench | 6 possible locations found | History

Community: FishNet 2 | Draw polygon Place marker Measure

Next Record(s) Lake Winnepesaukee, Fish Cove near mouth of T 108, 3.5 mi ESE of Meredith, Merrimack Watershed, elev. 504 ft

Correct Similar Records(2)

Skip Selected Lake Winnepesaukee, Smalls Cove, Merrimack system, 5.5 mi E of Gilford, elev. 504 ft; United States; New Ha

Add Comments UMMZ140837 *Catostomus commersonii commersoni*

Correction Report UMMZ140838 *Esox niger*

Logout

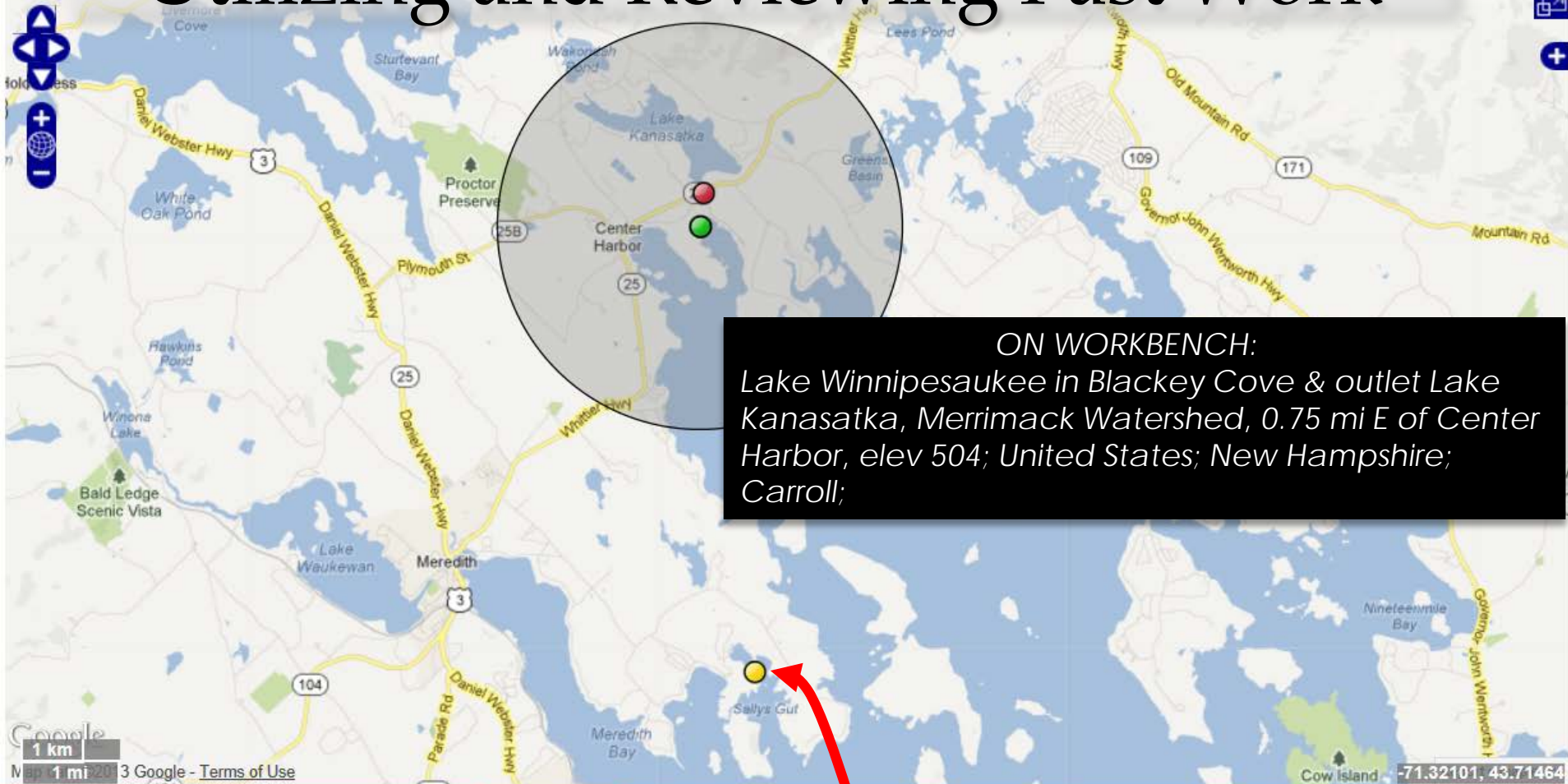
logged in as: nelson

Calculated Coordinates
 Lon: -71.433929
 Lat: 43.640311
 U. Radius: 259 m



4 possible locations found


Utilizing and Reviewing Past Work



ON WORKBENCH:
 Lake Winnepesaukee in Blackey Cove & outlet Lake Kanasatka, Merrimack Watershed, 0.75 mi E of Center Harbor, elev 504; United States; New Hampshire; Carroll;

Workbench 4 possible locations found History

- *corrected on 3/2/2013 10:33:16 am* Lake Winnepesaukee, Fish Cove near mouth of T 108, 3.5 mi ESE of Meredith, Merrimack
- *corrected on 3/1/2013 2:02:10 pm* Calcasieu River, 6.3 miles W of Jct of LA Hwy 113 and US 165.; United States; Louisiana; Rapides
- *corrected on 3/1/2013 2:02:10 pm* Calcasieu River, 6.3 mi. W. of Jct. of LA Hwy 113 & US 165; United States; Louisiana; Rapides
- *corrected on 3/1/2013 1:48:30 pm* Calcasieu River on La 113; United States; Louisiana; Rapides;
- *corrected on 3/1/2013 1:48:30 pm* Calcasieu River on LA 113; United States; Louisiana; Rapides;
- *corrected on 3/1/2013 1:48:30 pm* Calcasieu River, on LA 113; United States; Louisiana; Rapides;
- *corrected on 3/1/2013 1:29:16 pm* Soucook River, Merrimack system, 3 mi SSE of Concord, elev. 230 ft; United States; New Hampshire

move to workbench 

Options

- include localities with matching determination
- exclude outdated determinations

show 100 records

get history

Options

- get skipped
- get corrected

12 Technicians @ 1.5 years of georeferencing



“Corrected”

247,479 localities (88%)
1,172,360 specimen lots

“Skipped”

34,720 localities (12%)
126,881 specimen lots

Total Verified

282,199 localities
1,299,241 specimen lots

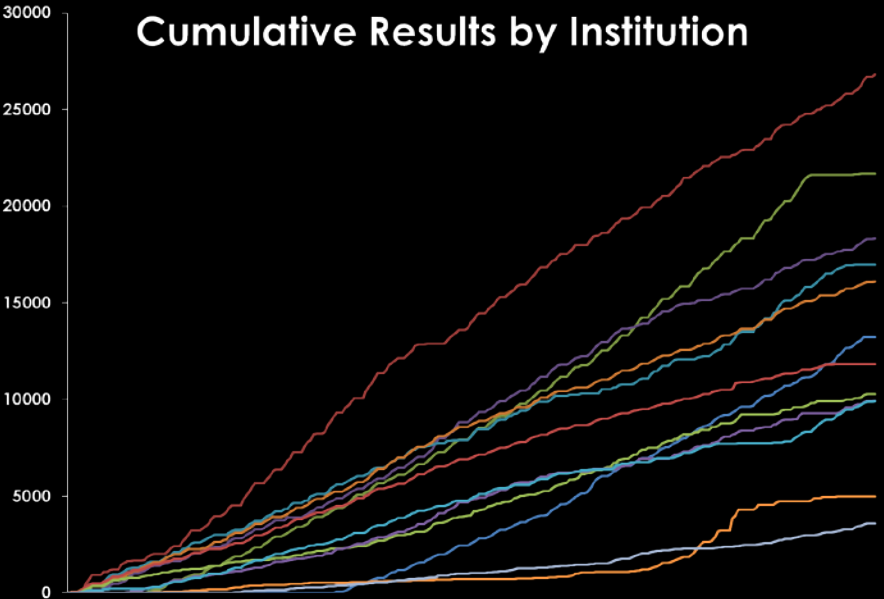
113% of project goal

Community-Wide
Daily Rates of Localities Georeferenced
(excluding volunteer effort)



11 January – 14 October 2013

Cumulative Results by Institution

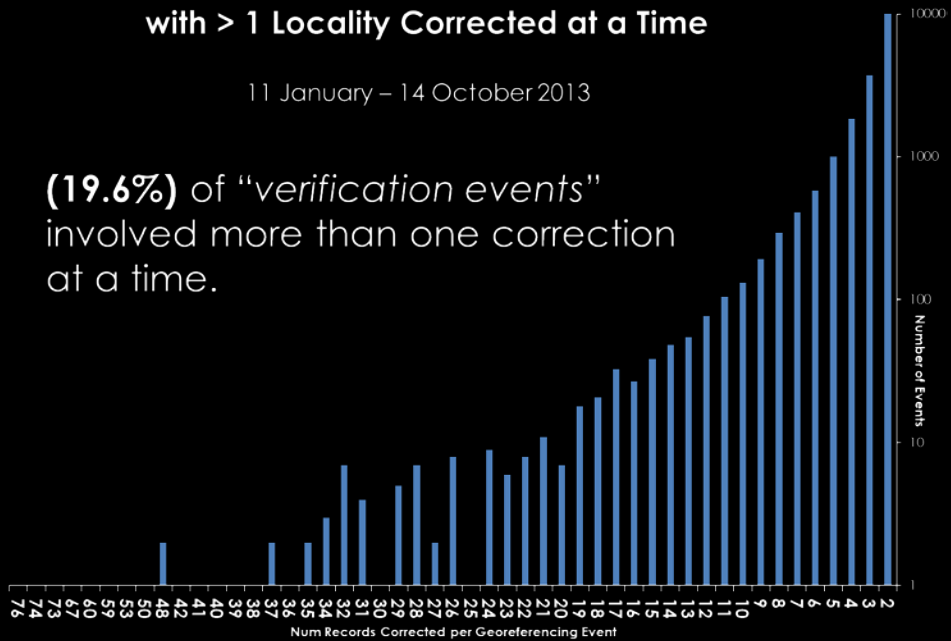


11 January – 14 October 2013

Distribution of Verification Events
with > 1 Locality Corrected at a Time

11 January – 14 October 2013













(19.6%) of "verification events" involved more than one correction at a time.



Repatriation

Results

The following datasets are available for download (zip compressed). All CSV files are UTF-8 encoded. If you have any questions, problems or discover errors in the data, please contact Justin Mann (jmann@tulane.edu).

Institution	Total Records Evaluated	% Corrected	Overview	Downloads
Academy of Natural Sciences Philadelphia	126,921	94%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
Akita Prefectural Museum	300	100%		CSV: Corrections MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
Austin Peay State University	1,798	98%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
Australian Museum	2,370	74%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
Bernice Pauahi Bishop Museum	416	91%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
California Academy of Sciences	100,243	91%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
Canadian Museum of Nature	30	70%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
Cornell University Museum of Vertebrates	72,525	93%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
CSIRO Marine Research	16,898	97%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
Field Museum	57,733	89%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
Fisheries Research Laboratory Mie University	14,284	97%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)
Florida Museum of Natural History	68,189	96%		CSV: Corrections Skips MS Access DB: ACCDB Shape File: SHP(points) SHP(polygons)

Project wide results were subdivided into institutional datasets and made available via the FishNet website on January 13, 2015.

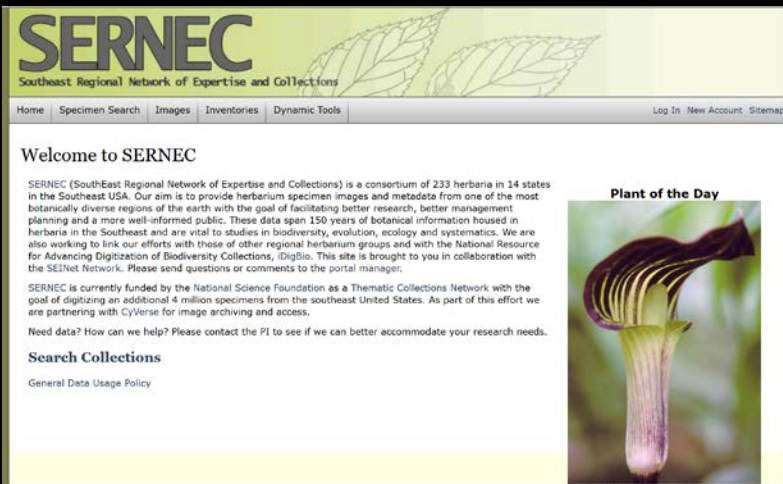
For each institution, an overview map was generated and results provided in multiple formats:

- UTF-8 encoded comma separated values (CSV)
- Microsoft Access Database (ACCDB)
- ESRI Shapefiles (SHP)

We are also working with specific institutions, as requested, to produce data-files with additional identifiers and/or formatting to further aid integration of results.

The Specify Project is providing integration services for collections using Specify.

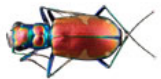
Keys to The Cabinets: SERNEC Digitization TCN



- The Southeast Regional Network of Expertise and Collections (SERNEC)

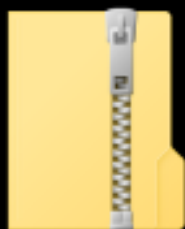


- Focused on digitization of over 4 million herbarium specimens from the southeast United States.



Symbiota

Promoting
Bio-Collaboration



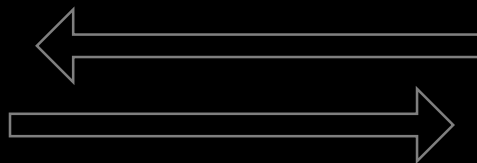
DwCA.zip

meta.xml
eml.xml
occurrences.csv
images.csv
identifications.csv

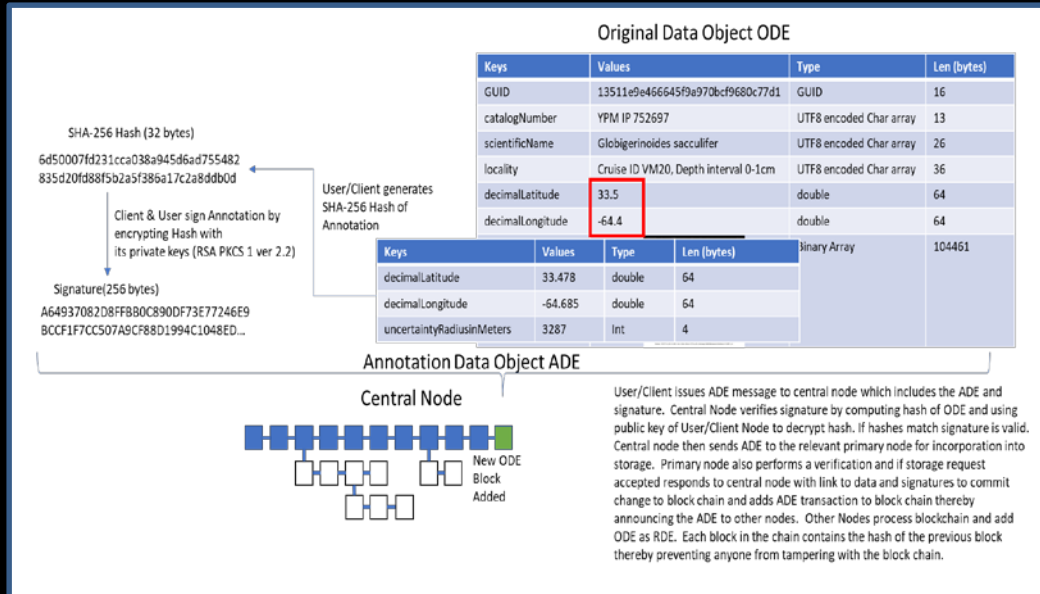
Data linkage based on
Darwin Core Archive

GUIDS enable
Real-Time
Data
Augmentation

occurrenceID
3790811c-8523-4100-ab49-828a3cd8585a
89ce17fa-522e-4d77-8b1a-a983ab546f1d
c133fd17-7fc7-4db8-b068-d63238fe19bb
06644de3-745f-4d27-a7da-476e5bcb96cb



Repatriation via Open Distributed Transaction Ledgers



Data Tacking
 Integrity Verification
 Identity Management
 Distributed Storage
 Fault Tolerance
 Reproducibility
 Meta Analysis
 Analytical Services

Marine Georeferencing: Needs

- Station, buoys, coastal and offshore features
- Locality Gazetteers
- Leverage fish data
- Trawl data start/stop coordinates
- Points, multi-points, lines, multi-lines, polygons multi-polygons or any combination.
- Who/When - Collector itineraries
- Depth of Collection
 - Bottom collections vs midwater vs surface
 - Depth could help identify uncertainty for bottom collections
- Additional map layers