Sharing fossil locality data for paleontological research

Digital Data 2020 | Discussion Session

Shared notes for today at **https://bit.ly/3cg383W**

“Georeferencing for Paleo” listening sessions

Two sessions held online in January 2020, ~45 people participated

What are your biggest challenges using georeference data in your research?

- Georeference data includes coordinates but does not include any metadata, like uncertainty
- Standards for georeferencing have changed and legacy georeferencing may not meet current standards

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“Georeferencing for Paleo” virtual workshop

April 28-29, 2020

- 52 participants
- 29 institutions
- mix of institutions (museums, university collections, agencies) and careers (collections professionals, researchers, informatics professionals)

Shared notes for today at **https://bit.ly/3cg383W**

This discussion session...

1. How do georeferencing issues affect the research community
2. What are common research applications of georeferenced paleo data?
3. What does “fitness-for-use” mean in regards to sharing and using georeference data for paleontological research?
4. Do researchers need more precise data or are truncated/rounded data acceptable?
5. Do researchers actually use uncertainty information when collections share it? If so, how?
6. How do researchers discover/access fossil locality data? Does this vary based on the precision needed?

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Digital Data 2020 Discussion Session:
Sharing fossil locality data for paleontological research

Date: 2020-06-03, 1pm Eastern

Abstract

Georeferencing, or the process of assigning latitude and longitude coordinates to collecting localities, is a crucial component of digitization for natural history collections. The paleontological collections community has recently been working to address critical issues related to georeferencing workflows and data quality. Many of these issues are common to georeferencing of all collection types, e.g. redaction of sensitive locality data, and methods for identifying and exchanging georeferences for shared localities. Others, such as integration of detailed geologic maps into georeferencing applications, are more discipline-specific.

This session will briefly present the results of input from the collections community on issues related to georeferencing fossil localities, gathered by the iDigBio Paleo Digitization Working Group via two online listening sessions held in January 2020, and a virtual mini-workshop held in April 2020. Subsequent discussion will focus on how georeferencing issues affect the research community, and what “fitness-for-use” means in regards to sharing and using georeference data for paleontological research.

Resources

Shared general notes for today’s discussion session (this document):
https://bit.ly/3cg383W

iDigBio Paleo Digitization Working Group:
https://www.idigbio.org/wiki/index.php/Paleo_Digitization_Working_Group

TDWG Earth Sciences and Paleobiology Interest Group:

https://github.com/tdwg/esp

More info about the “Georeferencing for Paleo” workshop (April 28-29, 2020):
https://tdwg.github.io/esp/georeferencing/2020-workshop.html

Paleo Digitization “Happy Hour” - next one is tomorrow, June 4th at 11am Eastern!
https://www.idigbio.org/content/paleo-digitization-happy-hour

Who is here today?

Feel free to add your name, institution, physical location, etc… all optional

- Carrie Levitt-Bussian, Natural History Museum of Utah (UMNH)
- Colleen Filipek, Jurica-Suchy Nature Museum, Lisle, IL
- Margaret Landis, Sam Noble Museum (OMNH), Norman, OK, USA
- Talia Karim, Univ. of Colorado
- Deborah Paul, Florida State University, iDigBio, Tallahassee, Florida, @idbdeb
- Gary Motz, Indiana University, Bloomington, IN
- Chris Adams, Royal BC Museum, Victoria BC
- Jessica Utrup , Yale Peabody Museum of Natural History, New Haven, CT, USA
- Adam Rountrey- University of Michigan Museum of Paleontology, Ann Arbor, MI
- Kim Madge, Canadian Museum of Nature, Ottawa ON
- Charlotte Hagelstam Renshaw, University of Montreal, Montreal, Canada
- Gil Nelson - iDigBio, UF
- William Simpson, Field Museum of Natural History, Chicago, USA
- Philip Buckland - Environmental Archaeology Lab, Umeå University, Sweden
- Paul Mayer, The Field Museum, Chicago, IL
- Francesca Pilotto - Environmental Archaeology Lab, Umeå University, Sweden
- (and you too)
- Natalia Lopez Carranza, Invert Paleontology Coll., University of Kansas
- Kimberly Cook, Indiana University, Bloomington, IN
- Benjamin Hess - University of Michigan Herbarium and Museum of Zoology, Ann Arbor, MI, US
- Susan Butts, Yale Peabody Museum, New Haven, CT
- Roger Colten, Yale Peabody Museum, New Haven, CT
- Istvan Mikó, UNH Collection of Insects and other Arthropods, Durham, NH, USA
- Nicole Volden, New Mexico Museum of Natural History and Science, Albuquerque, NM
- Austin Hendy, Natural History Museum of Los Angeles County
- Una Farrell, Trinity College Dublin, Ireland
- Lauren Gardiner, Cambridge University Herbarium, Cambridge, United Kingdom
- Katherine Mallalieu, University of Alberta Museums, Edmonton, AB, Canada
- Lisa Boucher, Non-vertebrate Paleo, University of Texas at Austin
- Jill Goodwin - iDigBio, UF

- Marta Bento, Faculdade de Ciências da Universidade de Lisboa, Portugal
- J Ryan Allen, University of Colorado Herbarium, Boulder, CO
- Aditi Jayarajan, University of Florida/Florida Museum, Gainesville, FL, USA
- Cody Bedke - Natural History Museum of Utah, Salt Lake City, UT
- Katy Estes-Smargiassi, Academy of Natural Sciences, Philadelphia, PA
- Evan Seed, Canadian Museum of Nature, Ottawa, ON
- Brad Ruhfel, University of Michigan Herbarium, Ann Arbor, MI
- Alyson Wilkins, Natural History Museum of Utah, Salt Lake City, UT
- Michelle Stocker, Virginia Tech, Blacksburg, VA
- Anne Kort, Indiana University, Bloomington, IN
- Holly Little, Smithsonian National Museum of Natural History, Washington, DC
- Amanda Lawrence, Smithsonian National Museum of Natural History, Washington, DC
- Beth Chambers, William & Mary Herbarium, Williamsburg, VA, USA
- Megan R. King, Rutgers Chrysler Herbarium, New Brunswick, New Jersey, USA
- Kesler Randall, San Diego Natural History Museum, San Diego, CA
- Janaki Krishna, UMNH- Salt Lake City, UT
- Lindsay Walker, Natural History Museum of LA County, Los Angeles, CA
- Austin Mast, Florida State University, Tallahassee, FL
- Glenna Nielsen-Grimm, UMNH-Salt Lake City, Ut
- Cassandra Robillard, Canadian Museum of Nature, Gatineau QC
- Trevor Dalton, Natural History Museum of LA County, Los Angeles, CA
- Chris Wilson, ACIS iDigBio, Gainesville, FL

Icebreaker

What is your favorite late-night snack?

- ???
- Popcorn +4
- Ice cream and cookies +4
- Pickles! +2 & Pickle juice! - Pickle back shots!
- M&Ms!
- Cookies!!!!!
    - Cookie dough +1
    - Vanilla creme +1
    - Chocolate chip+1
    - Oreos
    - Thin mints
    - Shortbread
- Anything with peanut butter +1
- Pretzels+1
- Chocolate +7
- Cheese Curds+2

- Beer! +3
- Crisps
- Wine +3
- Toast & honey
- Ice cream +1+2
- Buttered toast+1
- Getting more sleep outweighs snacks +1
- Sierra Nevada Pale Ale
- Tortilla Chips +2
- Tea & ice cream
- Cheese and apples

Q/A

Polls

How do you work with fossil locality data? Add a +1 to all that apply:

A. I generate fossil locality data through collecting/research +13
B. I manage fossil locality data+22
C. I use fossil locality data in my research+2+1+1+1+1+1+1+1+1+1
D. I georeference fossil locality data+6+1+1 +1+1+1+1+1+1+1+1+1+1
E. I work with other locality data+2+1 +1+1+1+1+1+1+1+1+1
F. Other, please feel free to specify below
    1) Wondering about how to deal with sharing data for sensitive material in our collections (Herbarium, rare plants, private land collections, National Parks etc.) +4
    2) Collections software project, hoping to inform future capability decisions +1
    3) What about time (age) - location is of little use without time-depth…+1

Prompts

Please include your answers or observations for the prompts below. You can also +1 an answer that is already given.

1. **How do georeferencing issues affect the research community?+4**

- Incorrect georeferencing creates noise in niche models +2
- Incorrect georeferencing creates spurious biogeographic distributions and incomplete georeferencing limits full utility of available specimen records +2
- Poor geological information that reduce precision of ages in fossils +1+1
- Incorrect coordinates lead to aggregation errors (and thus interpretations) when different data sources are integrated +1

- Incorrect georeferencing can lead to sites being damaged/destroyed when location data are used by planners/forestry (without regard for accuracy information)

2. What are common research applications of georeferenced paleo data?+1

- Revisit site.
- Monitor when sites were last visited/ how often/ how productive
- Niche modelling
- Generating biogeographic distributions/latitudinal range estimates
- Continuous collection
- Distribution changes as proxies for changes in climate and environment

3. What does "fitness-for-use" mean in regards to sharing and using georeference data for paleontological research? +3+1+1

- Fitness for use means that the data can be used for most common research applications right out of the box; or at least there is indication that minimum data quality standards are met (i.e. you can trust it to use in research applications)
-
-
-

4. Do researchers need more precise data or are truncated/rounded data acceptable?+1+1+1

- Precise data should be available for all research, but maybe not for the general public (particularly vertebrate paleo)+1+1+1 +1+1
- As someone who uses georeferenced data in research applications on a daily basis I have no major concerns with data truncated/rounded to 0.1° degree resolution (MOST cases)
- However, for some applications, more precise data is required, and institutions are generally forthcoming when this data is requested.+1
- From discussion: Less precise (maybe county) level can be ok when looking at biogeographic data, but would not enable revisiting the site
-
-
- See additional answers in discussion notes

5. Do researchers actually use uncertainty information when collections share it? If so, how?+3, +1+1+1+1+1

- How do you know they are using it?
- Yes, as a crude filter for trusting data
- For Quaternary biogeography - almost never, but the geographical resolution of the research is generally low
-
-
- See additional answers in discussion notes

6. How do researchers discover/access fossil locality data? Does this vary based on the precision needed?+1, +1+1

- PBDB
- BugsCEP (Quaternary insects)
-
-

Your questions?

[please submit and help answer them here].

- How do you deal with the legitimate location being outside of the incorrect place the georeferencing system choses (i.e. Mazon Creek coming up as Mazon City in the system)?
- Does everyone here know how / what to recommend to make future data (not yet collected) better?
    - Do folks know where to find recommendations for this to share in their communities, across stakeholders?
    - And add how you plan to disseminate it. How can we make sure all our stakeholders have this information?
    - Look to the libraries! Libraries (especially academic) offer great resources and guidelines for data management plans, etc.
        - yes! We definitely want to build from and point to existing resources and not reinvent as much as possible! Our work is mostly focused on any paleo specific guidelines needed for how we adapt those resources to our data.
- Are people aware of how to look at the issues in these data (locally and via aggregation)?

- How can we share our (researcher) corrections of other institutions data (obtained from aggregators)? Directly to institutions? Is there a way that annotations/feedback can be shared through aggregators?+2
    - I don't know about possibilities for driving that through the aggregators, but I can say as someone that manages a large dataset, I really appreciate when we get direct feedback from someone that is interested in helping us improve our data in this way.
- How to deal with massive backlog of locality data from the 1800's on up?
    - We've been using this quarantine time to start working through our backlog of localities that need georeferencing.
    - One topic that has come up a lot is how we can share this burden when we have overlapping localities. I hope that we continue figuring out a solution for that! I think this backlog is a major challenge for many of us.
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Other Notes

Michelle Stocker: on sharing where something is / was found, but can't really check it if locality information is fuzzy. Huge range of error anyway since she / they work in the Triassic period. Even county level is then useful enough for them.

EK: Asks about surface locality, usefulness for research?

<u>Uncertainty</u>
From Lauren Gardiner to Everyone: (1:22 PM)
I don't work with fossil data, but uncertainty/errors are hugely useful for herbarium material in my experience. Conservation assessments!
Susan Butts: I do not use uncertainty, but cut out at a minimum level of resolution
Deb: do you explain that in a publication?
Susan: not in the past, but would now possibly explain that using supplementary information in something like Dryad
J Ryan Allen: I would categorize that as using the uncertainty
Susan: She is looking for specific level of resolution, not using the uncertainty data provided with the georef information.
From Lauren Gardiner to Everyone: (1:24 PM)
It can also be a flag for uncertain data, and also for attempts to obscure data (eg sensitive sites and taxa)
From Lauren Gardiner to Everyone: (1:25 PM)
When georeferencing, I would _always_ want to record the error/degree of uncertainty I have in the data
From Lauren Gardiner to Everyone: (1:27 PM)

Agree - both types of uncertainty - in the field and when georeferencing
From J Ryan Allen to Everyone: (1:28 PM)
Yes I think the act of using a filter i.e. using only points with uncertainty of less than 5,000 meters is using the value. Especially if you do not use points not reporting uncertainty.
From Susan Butts to Everyone: (1:29 PM)
also, I should be using uncertainty! and I consider it essential for georefed locs!
Carrie: when asked for locality data it is always specific data (not at a less precise level like county level) - when they do begin sharing data they will need to share fuzzed data
From Adam Rountrey - UMich to Everyone: (1:32 PM)
People may be using uncertainty without really thinking about it. Knowing that a locality is within a county conveys uncertainty. For coordinate data, many may assume that it comes from a GPS and is precise. Having county or state centroids thrown in the mix can be problematic if those are not indicated somehow.
From Evan Seed to Everyone: (1:32 PM)
Uncertainty estimates might also be important for currently unknown uses of the data e.g. future use doesn't = current use
From Rebecca Renirie to Everyone: (1:32 PM)
I'm just listening too - I think having county-level (or broader) data in published, discoverable aggregators or repositories is useful; researchers can contact for more specific data. It will help keep people away from sensitive sites
From Deborah Paul (FSU, iDigBio) to Everyone: (1:33 PM)
Carrie, re Adam's point and yours, do you give researchers the points and the extra metadata to go with? Is there a chance to inform them on how to know more about that georeference?
From J Ryan Allen to Everyone: (1:34 PM)
@Adam there is a huge issue with derived coordinates with no georeferenceRemarks in Botany collections. Documenting how coordinates were derived is very important.
From Carrie Levitt-Bussian UMNH to Everyone: (1:35 PM)
@Deb, at this point, UMNH paleo has not georeferenced anything. I give the researchers exact loc coordinates (after permission from the land agencies, of course)

Gil: comments about precision - when doing field work and wanting to verify something we need the specific spot, not that it's in the park somewhere. Two levels

1. Tell the researcher how this point was derived with remarks- breadcrumbs (e.g. this was taken from a GPS device with the specific device information maybe) or georef by the technician, would like to know more about that technician and the process used

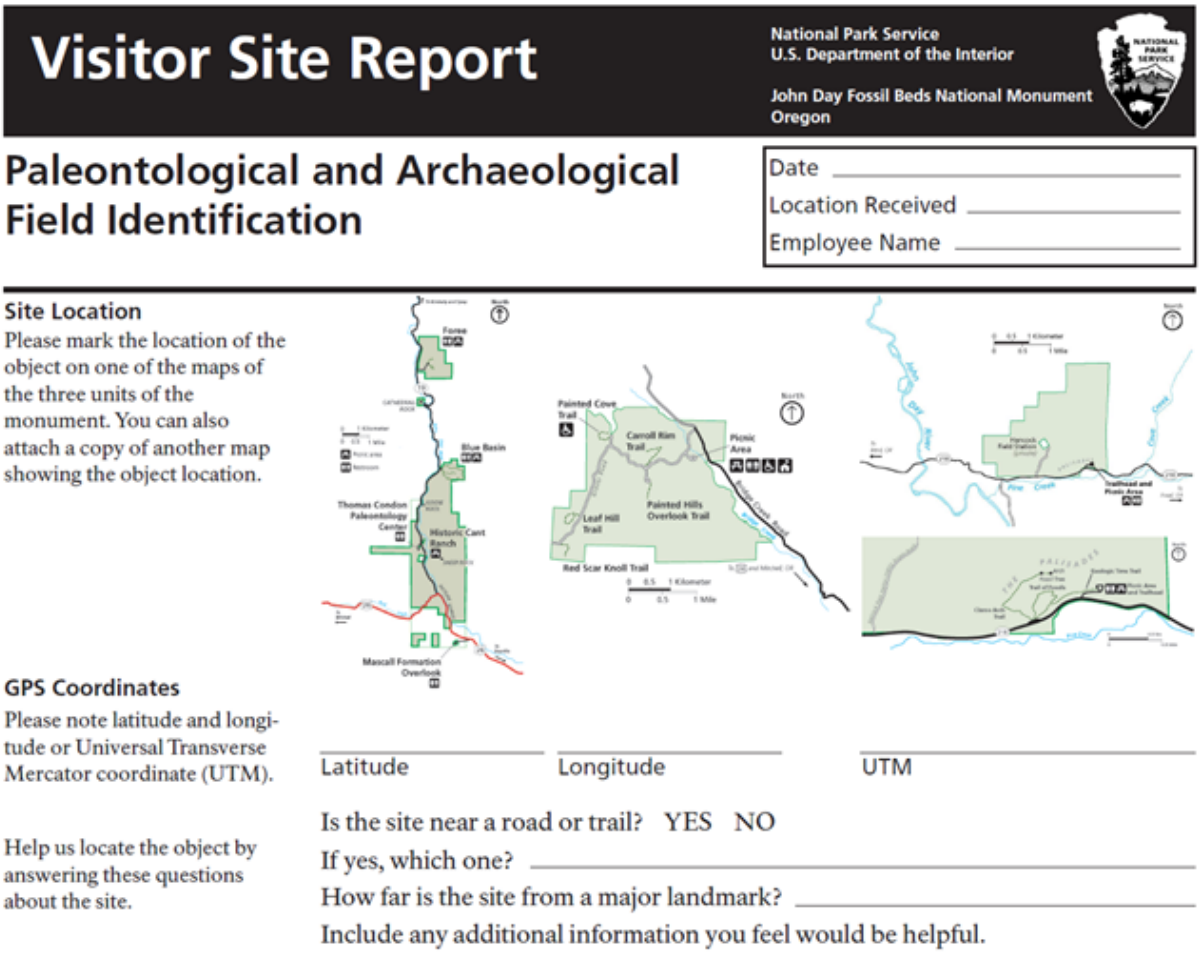
From Megan King to Everyone: (1:35 PM)
With the MAM (mid-atlantic megalopolis) project we make an assumption that prior to say 1990 was prior to GPS units…

Talia: How many people using georef data look at fields like georeference remarks

From Susan Butts to Everyone: (1:36 PM)
when I send collecting events to researchers it includes lat/long, radius of uncertainty, method, datum, and georeffer.
From Susan Butts to Everyone: (1:37 PM)
and a bunch of text fieldsi do not include a verbatim remarks field

Anne- GPS coords without datum. Digitizing loc data at John Day fossil beds. No one records as much data as they could/should.

- NV (NMMNHS) - This is going to be a big problem for us as we move into verifying our old coordinate data, at least half of our coordinate data have no datum
- Partial example of a visitor site report used at John Day Fossil Beds that creates an internal standard for locality data (this isn't the full worksheet but a good example to start)



Visitor Site Report

National Park Service
U.S. Department of the Interior

John Day Fossil Beds National Monument
Oregon

Paleontological and Archaeological Field Identification

Date _____
Location Received _____
Employee Name _____

Site Location
Please mark the location of the object on one of the maps of the three units of the monument. You can also attach a copy of another map showing the object location.

GPS Coordinates
Please note latitude and longitude or Universal Transverse Mercator coordinate (UTM).

Latitude _____ Longitude _____ UTM _____

Help us locate the object by answering these questions about the site.

Is the site near a road or trail? YES NO
If yes, which one? _____
How far is the site from a major landmark? _____
Include any additional information you feel would be helpful.

Larisa DeSantis- post-doc says that uncertainty not necessarily an issue if you are working with animals that might have had a large range to begin with

AW- Symbiota has a fuzzing option for sensitive loc data

Related challenges with sensitive data (locality and other)
Brad Rufel- UMich Herb- blocking loc data for sensitive species within michigan, but not for outside the state. Too much information to try and manage

From Lauren Gardiner to Everyone: (1:49 PM)
Not for preserved collections but iNaturalist obscures threatened taxa localities to a 10km grid square - and it's automated via a link to the IUCN Red List
(plus data contributors and project owners can restrict other records themselves)
From Megan King to Everyone: (1:50 PM)
Yes, but the issue there is that things like IUCN doesn't exactly include the NJ state rare and endangered
From Lauren Gardiner to Everyone: (1:50 PM)
Nope, this is for global RLAs
From J Ryan Allen to Everyone: (1:50 PM)
We struggle with this as well. Rare in Colorado might be common elsewhere
From Megan King to Everyone: (1:50 PM)
Sometimes species are missing, or aren't listed globally.
From Lauren Gardiner to Everyone: (1:52 PM)
It's an imperfect system, but I was with a team that was working with the iNat folk to make sure global threatened taxa were automatically obscured. It was a big deal for someone working on orchids in Madagascar!
From Glenna Nielsen-Grimm to Everyone: (1:52 PM)
as an archaeologist, we cannot share site location data, and its pretty much controlled through our Utah SHPO
From Chris Wilson to Everyone: (1:52 PM)
Instead of rounding coordinates I like the Uber H3 system. It just associates a polygon containing the location
From Glenna Nielsen-Grimm to Everyone: (1:53 PM)
In our online collections data, we only allow information at the county level for site data
From Gary Motz, Indiana University to Everyone: (1:54 PM)
Many states do not have a state paleontologist, or even if they do, they may lack the administrative/regulatory capacity to enforce quite like a SHPO.
From Megan King to Everyone: (1:54 PM)
@ Lauren, I couldn't agree more, the other thought of mine is, that it will be taken care of at one point or another, how much danger does this put to these localities if it takes time to obscure. I often wonder if its best that it is obscured from the beginning and then can be clicked off to be 'un-obsured' so to speak
From Lauren Gardiner to Everyone: (1:56 PM)

Absolutely, @megan - we wanted to make sure that the default was to obscure things that were likely to be threatened - and then we could override that if taxa were common, so for orchids we lobbied that they would all be automatically obscured.

From Chris Wilson to Everyone: (1:57 PM)
What happens when you round coordinates and someone trespasses that property and digs something up?
From Chris Wilson to Everyone: (1:57 PM)
Like a power line?
From Chris Wilson to Everyone: (1:58 PM)
https://eng.uber.com/h3/
From Chris Wilson to Everyone: (1:59 PM)
A non-specific location that's a point and uncertainty parameter still specifies a point.

- Working on a tool that gets away from an exact point with uncertainty data

From Kesler Randall - San Diego Natural History Museum to Everyone: (2:00 PM)
We (San Diego Natural History Museum) are on the verge of posting data to VertNet, iDigBio, and GBIF and are planning on rounding to tenth of a degree and including uncert. radius and GeoRef comments.

<u>Who/what are we worried about leading to restricting data</u>
From Adam Rountrey - UMich to Everyone: (1:56 PM)
@Megan - for paleo- commercial collectors
From Cassandra Robillard to Everyone: (1:56 PM)
@Deborah - I think about that every time we discuss obscuring sites within our collection data. Really good question for discussion.
Talia: [made comments that I missed]
From Deborah Paul (FSU, iDigBio) to Everyone: (1:58 PM)
That's interesting as a potential Policy-Level georeference standard that could be reached and disseminated Talia.

Anne Kort- wrote paper using data for fossil yield at John Day Fossil Beds… how much did you collect in an area one year versus in a subsequent year.

Phil Buckland- archaeo- Quaternary climate change using fossil insects. So super specific loc data not that important. But for other projects, where looking at how an archaeo site might be threatened by climate change would need very specific loc data. Have a wide variety of accuracy in recording archaeo sites… problematic for downstream use by forestry companies who take the data but don't understand it. Might end up wrecking archaeo sites.

<u>Sharing/Reaching out for Expertise for Georeferencing</u>
From Austin Hendy to Everyone: (1:51 PM)

There is a clear disparity in georef quality between U.S. institutions georef'ing South American localities, and South American institutions georef'ing localities in their own countries
Worth reaching out to researchers/collaborators in those regions
https://www.idigbio.org/wiki/images/2/29/1_iDigBio_Berkeley_Hendy.pdf

Citing data and how data use is included in publications
Deb's questions: Maybe we don't know if / or how uncertainty data is being used (or for what) because of the way research is done, doesn't share this in "methods" section of any paper. Could this be why we have trouble understanding if / how it's being used.
Talia: how do you cite that used iDigBio or PBDB for data? Easy to do for a paper, but if we've added to that data point, it's not well known how to show where you got that information (paraphrasing) [+1]
From Austin Hendy to Everyone: (1:26 PM)
Not mainstream yet to cite digital data sources (though changing).....likewise, while collection community are hyper focused on standards, the research community do not report those standards

What to include in shared data (for aggregators)
From Nicholas Rejack to Everyone: (1:33 PM)
idigbio:InformationWithheld should be used to indicate records that have suppressed sensitive information. Typically we expect values like "location information not given for endangered species, contact my@email"
From Nicholas Rejack to Everyone: (1:33 PM)
This is a Darwin Core term too, "dwc:InformationWithheld"
From Deborah Paul (FSU, iDigBio) to Everyone: (1:34 PM)
there's also dwc:dataGeneralizations where you can report what standard steps you you did to the coordinates (to fuzz them, for example)
From Evan Seed to Everyone: (1:41 PM)
Comments or metadata on how a point was georeferenced is important

Future Workshops?
From J Ryan Allen to Everyone: (1:39 PM)
@Deb, it was part of train the trainers GeoRef workshop, but maybe we could hold a "How to collect better field data workshop" for the broader community? +1+1

Ryan, We did Field To Database for exactly this reason. Sounds like we could do it again, V2.

Historic Names
From Michelle Stocker to Everyone: (2:09 PM)

That will be very useful, Carrieand also when one locality has multiple names across different institutions
From J Ryan Allen to Everyone: (2:10 PM)
When geography changes we try to keep the current country accurate and demote the old country name to the locality field.
From J Ryan Allen to Everyone: (2:11 PM)
that said most of our efforts have been North America centric
From Alyson Wilkins to Everyone: (2:11 PM)
I think it's always important to be up to date with place names especially in your collections databases but I also thinks it's important to retain historical names for their use for history or cultural projects
From Cindy Opitz to Everyone: (2:12 PM)
There isn't always a one-to-one correspondence, however, between historic names and current ones
From Megan King to Everyone: (2:12 PM)
Link for the gazetteer for localities?

Resource Links:

- MAM resources for some georef guidelines and such: https://www.mamdigitization.org/reporting
- **QGIS Lesson** https://data-lessons.github.io/QGIS-nhcdata-lesson/
- **Bloodhound**: https://bloodhound-tracker.net/
- **Here's a link to the talk from the Georef4Paleo workshop about field-to-database data management using ArcGIS**: https://vimeo.com/410610874
- **ArcGIS Survey123 for digital field worksheets: https://survey123.arcgis.com/** (Gary Motz: While Survey123 is an ESRI proprietary product, it does integrate well with open data infrastructures)
- **Protecting Paleo Data Localities**: https://tdwg.github.io/esp/georeferencing/policies/Protecting-Paleontological-Locality-Data-from-a-BLM-Perspective_2020.pdf
- **Related discussion --** 'Imagining a Global Gazetteer of Georeferences' / recent Darwin Core Hour (https://docs.google.com/spreadsheets/d/1ZpFM1-wukEzFSrgeQDdG3oUMPMuf6tz1VPfaX7QMfNw)
- **Locality / georeferencing data standards** (https://dwc.tdwg.org/terms/#location)
- **BLM perspective on sharing localities -** https://tdwg.github.io/esp/georeferencing/policies/Protecting-Paleontological-Locality-Data-from-a-BLM-Perspective_2020.pdf^
- **Georeferencing**: https://tdwg.github.io/esp/georeferencing/2020-workshop.html
- **GEONAMES:** https://www.geonames.org/about.htm

- **Searching for historic localities:** lhttp://www.getty.edu/research/tools/vocabularies/tgn/index.html
- **Imagining a Global Gazetteer of Georeferences:** https://github.com/tdwg/dwc-qa/wiki/Webinars#chapter17
- **"Happy Hours"** https://www.idigbio.org/content/paleo-digitization-happy-hour
- **Darwin Core Hour:** Imagining a Global Gazetteer of Georeferences see https://github.com/tdwg/dwc-qa/wiki/Webinars#chapter17
    - https://github.com/tdwg/dwc-qa/wiki/Webinars

Future Talks/Presentations/Conferences for more information:

- Leslie Skibinski from PRI isn't here today but she is giving a talk next week at *SPNHC on Publishing Fuzzy Data to the Web Portal*, if anyone is interested.
    - https://spnhc.org/virtual-meeting-2020-program/virtual-meeting-2020-thursday/