Harvard University
Museum of Comparative Zoology
26 Oxford Street
Cambridge, Massachusetts 02138

October 2018

MCZ Guidelines for Recording Locality Data in the Field

Complete locality data should accompany all collected materials. The following locality guidelines promote data quality and fitness and describe required information from collectors submitting specimens.

Localities

Localities should consist of a combination of geographic coordinates and descriptive text. Although coordinates may accurately express the position of a collecting site, a written description allows for the validation of these points, in which errors are otherwise difficult to detect, and provides the collector with details to help them recall the locality years or decades later. Descriptions should be detailed, the more the better. Make your assumptions explicit to avoid ambiguity. Good specific localities typically include a distance along a path from a well-defined landmark (i.e., bridge, intersection), or by two orthogonal distances from a named place/feature and avoid vague terminology such as "near." Reference points should be stable in position over time, small in extent, and easy to locate on a map. If it's 2.5 miles N or Smithfield on route X, be more explicit about whether the 2.5 miles is from the center of Smithfield, the post office (provide address), or the boundary of Smithfield on Route X, and whether the 2.5 miles are road miles from an odometer or as the crow flies with a GNSS/GPS* pointer or a map. [More examples provided on last page]

Country

Descriptive text for a locality should include the set of geopolitical entities within which the locality is located (Country, State/Province, County/Shire/Parish, municipality, *etc*.). When collecting on land, the Country is usually evident, however country must also be recorded any time that material is collected in border waters or at sea. Record the name of the country (permit requiring country at this locality) or if marine and outside the exclusive economic zone of any country, then "High Seas".

Coordinates

Coordinates should be recorded in decimal degrees when possible. Provide the original values if they were recorded in a different form (e.g. degrees minutes seconds) or a different coordinate system (e.g. UTM/UPS).

A minimum viable georeference consists of the following 5 elements:

1. decimal latitude
2. decimal longitude
3. coordinate precision
4. geodetic datum
5. coordinate uncertainty in meters

Coordinate Precision

The number of digits beyond the decimal should reflect the precision of the original coordinates, if they were converted to decimal degrees from a different system (i.e., degrees minutes seconds), or a realistic number of digits for the precision of the coordinate (as a rough rule of thumb, 5 digits of precision in decimal latitude gives approximately 1-meter precision).

Datum

The geodetic datum is an essential part of a coordinate description and provides the frame of reference for the measured points. Reporting the wrong datum or none at all can result in positional errors of

hundreds of meters. If you are using a GNSS/GPS receiver, set the geodetic datum to WGS84. If you are obtaining coordinates from a map, record the geodetic datum used by that map and the coordinates in the coordinate system as read off the map. (See Elevations below for vertical Datum).

Coordinate Uncertainty

When recording a coordinate from a map, include an estimate of the uncertainty of the coordinate based on the scale of the map and your ability to accurately place the locality on the map (e.g. if the map scale is 1:10000 and you are sure of the location of the locality to within a 1 cm circle on the map, your coordinate uncertainty in meters is at least 100 meters). If you are using a GNSS/GPS receiver, record its reported accuracy, increase this uncertainty if you have reason to believe the GNSS signal is degraded.

GNSS/GPS Accuracy[1]

Record GNSS/GPS accuracy with coordinates. Accuracy is calculated based on local conditions at the time of reading and can make a non-trivial contribution to the overall uncertainty of a locality. Some GNSS/GPS receivers can conduct waypoint averaging to obtain a more accurate location for a waypoint. For the GNSS/GPS receiver, also record whether WAAS is turned on or not.
You can use a GNSS/GPS receiver to convert a local coordinate system and datum from a map to Latitude/Longitude with WGS84 (EPSG: 4326). If doing so, make sure you record the original coordinates, their coordinate system, and the geodetic datum used by the map.

Extent

If your locality is not simply described by a point and a radius of uncertainty (e.g. if it is a transect), specify the spatial extent of the locality, measured as the distance from the point where coordinates are read to the furthest point within the named place boundary where collecting occurred (length of transect/quadrat, city block, tide pool, *etc.*). Gazetteers often give bounding boxes to describe the extents of large places such as cities and counties. Extent measurements convey how specific a named locality is (0.5 miles vs. 0.5 feet) and binds uncertainty by eliminating areas outside of the stated extent.

Elevations

Elevations reported by a GNSS/GPS receiver are much less reliable than horizontal positions (latitude/longitude). If elevation is a defining piece of a locality description, use an instrument such as a calibrated barometric altimeter for accurate measurements. Record the vertical datum used as well as the method used to determine the elevation. Vertical datums are either: tidal, based on sea levels; gravimetric, based on a geoid; or geodetic, based on the same ellipsoid models of the Earth used for computing horizontal datums. A GNSS/GPS receiver may not report what vertical datum it is using. Maps will indicate their vertical datum (e.g., meters above mean sea level) as well as their geodetic horizontal datum (e.g., NAD27). If you are collecting near a shoreline and are including the elevation of a locality as determined from a map, then also record the vertical datum for the map (e.g. mean sea level).

References

Fully document any references or tools used to describe localities as follows:
Gazetteers or Road Atlases: record complete citation
Maps: Title, Publisher, Scale, Year, Sheet Number

[1] GPS is just one of several Global Navigation Satellite Systems (GNSS), and modern GPS receivers tend to be GNSS receivers listening to more than one satellite constellation.

GPS device or Altimeter: record make and model
Remember that data have the potential to be used in ways unforeseen than when originally collected, and capturing complete data is essential to both current and future research endeavors.

Images

Take pictures to document your localities. Images of a locality help document and supplement the textual locality description, will be a great help for you to recall a locality in the future, and have significant potential for future reuse in documenting habitat, disturbance, etc. A cell phone camera with location services turned on will usually add a georeference to the image metadata. It is possible to use a digital camera and GNSS/GPS receiver together to record a track of locations and timestamps, and then later add those locations to image metadata.

Locality Description Examples of Common Problems & Tips to Correct:

Localities that give a large area without more specific detail:

BAD: 4 mi N of Tyngsborough/Nashua border [Why: Could mean anywhere 4 miles north along the common border]
GOOD: 4 road mi N of Tyngsborough/Nashua border on Route 3, Hillsborough County, New Hampshire
BAD: Pond along Chatahoochee River, Fulton Co., Georgia [Why: Which pond?]
GOOD: Pond, 0.43 mi SW of intersection of Nancy and Ridgewood Roads, Chattahoochee River National Recreation Area, Fulton Co., Georgia

Names of Roads without additional points of reference:

BAD: Highway 9, Alajuela Province, Costa Rica [Why: Could be anywhere along the highway]
GOOD: Intersection of Hwy 9 and Rio Cariblanco, Cariblanco (town), Alajuela Province, Costa Rica

Directions given with no distances, road or air miles noted:

BAD: S Berkeley, Alameda County, California [Why: Could be anywhere south of Berkeley]
GOOD: Oakland, 1 mi S Berkeley on Telegraph Ave. (1 mi S of intersection of 66th St and Telegraph Ave), Alameda Co., California

Multiple cities described by the same name within the same administrative unit:

BAD: San Marcos, Intibuca Province, Honduras [Why: There are at least five San Marcos in Intibuca Province]
GOOD: San Marcos, ca 7.5 km south of Los Chaguites, Intibuca Province, Honduras

Cities and geographic features that share the same name [in this case, note which locality is intended]:

BAD: Battle Mountain, Lander Co., Nevada [Why: Unclear if reference is the city or mountain]
GOOD: Battle Mountain (city), Lander Co., Nevada

Highway mi/km markers are difficult to georeference retrospectively without additional information:

BAD: Km 58 Pan American Highway [Why: Markers are not permanent, may be moved over time]
GOOD: Km 58 Pan American Highway, 6 km S of the center of Cartago on Pan American Highway, Cartago Province, Costa Rica

Keep in Mind:

Be aware when crossing county/state/country lines while collecting. Be sure to record the correct names and specify clearly if using a town in a different county/state as an offset (e.g., 10 mi below Ehrenberg [La Paz Co, Arizona] on the Colorado River, Imperial Co., California).
Correctly spell foreign localities (include all diacritic marks) – misspellings in familiar place names are easily corrected but may cause confusion in other languages (e.g. Turrubares vs. Turrucares, Barra Blanca

vs. Vara Blanca).

Descriptive localities lacking coordinate data recorded as a city name are georeferenced as the centroid of the city. Note instead if the specimen is collected on the outskirts of the city and provide as much specific detail as possible (such as an exact intersection or feature, e.g., Ann Arbor, 0.5 mi. N of Dolph Lake).

If a locality is known by a locality number or informal locality name, make sure you record this name or number and your own detailed description of the locality.

Places change over time, populated areas grow, businesses close or move, meandering rivers move, roads can be changed, mile marker numbering can change, etc. It is best to describe localities in terms of landmarks that can be identified on a particular map, and to record which map you were using at the time.