Biodiversity Data Mobilization Workshop Part 2: Data Capture

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Objectives

- Learn about the concept of standards, particularly the Darwin Core Standard
- Discuss the types of primary biodiversity data and how to share that information within GBIF.
- Review principles of data quality in the context of data capture

Standards

- A combination of convention, rule, requirement, norm, specification
- To provide clarity and ease of communication
- Units of measurement, alphabets, languages, emojis
- Provide a way of constraining possibilities
 - Date format MM/DD/YYYY, DD/MM/YYYY, YYYY/MM/DD
- Map Coordinates (Longitude and Latitude)



Standards for Data Transfer

- Application schema
 - Specific combinations of data standards for a particular purpose
 - Darwin Core terms within Darwin Core Archives
- Format
 - Restricts dataset structures (xml, csv)
- Transfer protocol
 - Where and how to send content (http, ftp, smtp)

Biodiversity Information Standards (TDWG)

- Also known as the Taxonomic Databases Working Group
 - Develops, ratifies, promotes guidelines for the recording and exchange of data about biological organisms
- Data standards are the rules by which data are described and recorded.
- Darwin Core
 - Current standard since 2009
 - Maintained by the Darwin Core Maintenance Group

Darwin Core

The Darwin Core Maintenance Group is responsible for maintaining the various components of the Darwin Core Standard, which includes managing suggested changes to the vocabulary, providing usage guidelines and examples, and ensuring the preservation and stability of metadata related to components of the standard. Maintenance Group members have a strong interest in ensuring the stability, interoperability, and evolution of the vocabulary.

GitHub 😱

Convener

• John Wieczorek - VertNet, USA

Core members

- Peter Desmet Research Institute for Nature and Forest (INBO), Belgium
- Markus Döring Global Biodiversity Information Facility (GBIF), Denmark
 Tim Robertson Global Biodiversity Information Facility (GBIF). Denmark
- Steven Baskauf Vanderbilt University Heard Libraries, USA
- Paula Zermoglio VertNet, USA

On this page

Convener Core members Motivation Becoming involved History and context



Carlos San

On this page

Record-level

Darwin Core

Home Terms - Guides - GitHub

Darwin Core Quick Reference Guide

This document is intended to be an easy-to-read reference of the currently (as of 2021-07-15) recommended terms maintained as part of the Darwin Core standard and is maintained by the Darwin Core Maintenance Group.

- Includes a glossary of terms intended to facilitate the sharing of information about biological diversity
- Simple Darwin Core predefined subset of fields
 - Record, Occurrence, Organism, Material Sample, Event, Location, Geological Context, Identification, Taxon
- Auxiliary Classes
 - ResourceRelationship, MeasurementOrFact
- DwC Quick Reference Guide (https://dwc.tdwg.org/terms) Your "go-to" resource
 - Provides a list of all recommended terms of the Darwin Core Standard
 - Identifier, definition, comments, examples

DwC Terms:OccurenceID

occurrenceID

Identifier	http://rs.tdwg.org/dwc/terms/occurrenceID
Definition	An identifier for the Occurrence (as opposed to a particular digital record of the occurrence). In the absence of a persistent global unique identifier, construct one from a combination of identifiers in the record that will most closely make the occurrenceID globally unique.
Comments	Recommended best practice is to use a persistent, globally unique identifier.
Examples	http://arctos.database.museum/guid/MSB:Mamm:233627,000866d2- c177-4648-a200-ead4007051b9,urn:catalog:UWBM:Bird:89776

On this page Record-level Occurrence Organism MaterialSample Event Location GeologicalContext Identification Taxon MeasurementOrFact ResourceRelationship UseWithIRI ^



DwC Terms: BasisOfRecord

basisOfRecor	d	On this page
Identifier	http://rs.tdwg.org/dwc/terms/basisOfRecord	Record-level Occurrence
Definition	The specific nature of the data record.	Organism
Comments	Recommended best practice is to use the standard label of one of the Darwin Core classes.	Event Location
Examples	PreservedSpecimen, FossilSpecimen, LivingSpecimen, MaterialSample, Event, HumanObservation, MachineObservation, Taxon, Occurrence, MaterialCitation	GeologicalContext Identification Taxon

DwC Terms: EventDate

eventDate		On this page
Identifier	http://rs.tdwg.org/dwc/terms/eventDate	Record-level
Definition	The date-time or interval during which an Event occurred. For occurrences, this is the date-time when the event was recorded. Not suitable for a time in a geological context.	Organism MaterialSample Event
Comments	Recommended best practice is to use a date that conforms to ISO 8601-1:2019.	Location GeologicalContext Identification
Examples	1963-03-08T14:07-0600 (8 Mar 1963 at 2:07pm in the time zone six hours earlier than UTC). 2009-02-20T08:40Z (20 February 2009 8:40am UTC). 2018-08-29T15:19 (3:19pm local time on 29 August 2018). 1809-02-12 (some time during 12 February 1809). 1906-06 (some time in June 1906). 1971 (some time in the year 1971). 2007-03-01T13:00:00Z/2008-05-11T15:30:00Z (some time during the interval between 1 March 2007 1pm UTC and 11 May 2008 3:30pm UTC). 1900/1909 (some time during the interval between the beginning of the year 1900 and the end of the year 1909). 2007-11-13/15 (some time in the interval between 13 November 2007 and 15 November 2007).	Taxon MeasurementOrFact ResourceRelationship UseWithIRI LivingSpecimen PreservedSpecimen FossilSpecimen MaterialCitation HumanObservation MachineObservation Cite Darwin Core

DwC Terms: Country and Country Code

On this page country http://rs.tdwg.org/dwc/terms/country Record-level Identifier Occurrence Definition The name of the country or major administrative unit in which the Location occurs. Organism MaterialSample Comments Recommended best practice is to use a controlled vocabulary such as the Getty Event Thesaurus of Geographic Names. Recommended best practice is to leave this field Location blank if the Location spans multiple entities at this administrative level or if the GeologicalContext Location might be in one or another of multiple possible entities at this level. Identification Multiplicity and uncertainty of the geographic entity can be captured either in the term higherGeography or in the term locality, or both. Taxon MeasurementOrFact Examples Denmark, Colombia, España ResourceRelationship UseWithIRI LivingSpecimen countryCode PreservedSpecimen FossilSpecimen http://rs.tdwg.org/dwc/terms/countryCode Identifier MaterialCitation The standard code for the country in which the Location occurs. Definition HumanObservation MachineObservation Recommended best practice is to use an ISO 3166-1-alpha-2 country code. Comments Cite Darwin Core Examples AR, SV

Data Origins and Types

• Dataset metadata

• Descriptive information

• Species checklists

- Species in countries and areas
- A simple list of taxa present in a given area (Flora of Malaysia, Fauna of Mt. Makiling)

Occurrence-only data

- Specimens with dates and coordinates, logs or field notes with taxa observed and collected
- Simple observation in the field or specimens in a collection

Sampling-event data

- Specimens with dates, coordinates, methods, abundance, absence
- Added in GBIF in 2015; used for sharing more complex information about a sampling event

Checklist Dataset



Philippine Red List of threatened wild fauna

Part I - Vertebrates

FLORA OF MALAYSIA i-Newsletter Part 1

Occurrence Dataset





Occurrence Dataset

2	А	В	С	D	E			F	G	н	1	J	К	L	М	
1	occurrenceID	catalogNumber basis	OfRecord	eventDate	scientificName		acceptedNam	neUsageID	kingdom p	hylum o	class	order fa	mily	genus	specificEpithet	infras;
2	UPLB-MNH-ZWM-RABOR 0038	0038 Pres	ervedSpecimen	1962-01-22	Cynopterus brachyotis (Muller, 1838)				Animalia C	hordata 1	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
3	UPLB-MNH-ZWM-RABOR 0040	0040 Pres	ervedSpecimen	1960-02-19	Cynopterus brachvotis (Muller, 1838)				Animalia C	hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
4	UPLB-MNH-ZWM-RABOR 0041	0041 Pres	ervedSpecimen	1960-08-22	Cynopterus brachyotis (Muller, 1838)		1		Animalia C	hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
5	UPLB-MNH-ZWM-RABOR 0042	0042 Pres	ervedSpecimen	1960-03-12	Cynopterus brachyotis (Muller, 1838)				Animalia C	Chordata 1	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
6	UPLB-MNH-ZWM-RABOR 0043	0043 Pres	ervedSpecimen	1960-10-21	Cynopterus brachyotis (Muller, 1838)				Animalia C	hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
7	UPLB-MNH-ZWM-RABOR 0044	0044 Pres	ervedSpecimen	1961-06-25	Cynopterus brachyotis (Muller, 1838)				Animalia C	hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
8	UPLB-MNH-ZWM-RABOR 0045	0045 Pres	ervedSpecimen	1961-11-28	Cynopterus brachyotis (Muller, 1838)				Animalia C	hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
9	UPLB-MNH-ZWM-RABOR 0046	0046 Pres	ervedSpecimen	1962-08-31	Cynopterus brachyotis (Muller, 1838)				Animalia C	hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
10	UPLB-MNH-ZWM-RABOR 0047	0047 Pres	ervedSpecimen	1963-10-28	Cynopterus brachyotis (Muller, 1838)				Animalia C	"hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
11	UPLB-MNH-ZWM-RABOR 0049	0049 Pres	ervedSpecimen	1964-02-11	Cynopterus brachyotis (Muller, 1838)				Animalia C	hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
12	UPLB-MNH-ZWM-RABOR 0051	0051 Pres	ervedSpecimen	1963-12-20	Cynopterus brachyotis (Muller, 1838)				Animalia C	hordata 1	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
13	UPLB-MNH-ZWM-RABOR 0052	0052 Pres	ervedSpecimen	1962-01-22	Cynopterus brachyotis (Muller, 1838)				Animalia C	hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
14	UPLB-MNH-ZWM-RABOR 0053	0053 Pres	ervedSpecimen	1962-01-22	Cynopterus brachyotis (Muller, 1838)				Animalia C	"hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
15	UPLB-MNH-ZWM-RABOR 0082	0082 Pres	ervedSpecimen	1964-09-28	Cynopterus brachyotis (Muller, 1838)				Animalia C	Chordata 1	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
16	UPLB-MNH-ZWM-RABOR 0085	0085 Pres	ervedSpecimen	1964-09-30	Cynopterus brachyotis (Muller, 1838)				Animalia C	hordata l	Mammalia	Chiroptera P	teropodidae	Cynopterus	brachyotis	
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4	species F. Empeso & D.S. Rab	or	Kinatarkar	i, Sta. Fe, Cel	ou Province	Brgy.	Kinatarkan	Sta. Fe	Cebu	PI	н	Philippines	Cebu Island	11.320515	123.897072	2
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Sampling-Event Dataset

SAMPLING EVENT REGISTERED MARCH 27, 2019

Amphibians and Reptiles in Selected Sites in Palawan Province, the Philippines

Published by HerpWatch Pilipinas, Inc.

Pili A

DATASET PROJECT METRICS ACTIVITY & DOWNLOAD

We report here a sample-event dataset of herpetofaunal surveys conducted by HerpWatch Pilipinas, Inc., and partners in selected sites in Palawan Province, the Philippines. We used a combination of systematic sampling using standardized techniques and opportunistic sampling to survey the diversity of amphibians and reptiles in the following sites: (1) Mabentangen Creek, Barangay Poblacion 6, Municipality of Coron, Busuanga Island; (2) Estrella River Falls Park, Barangay Estrella, Municipality of ... More

Project ID: BIFA3_026

Publication date: May 5, 2019 Metadata last modified: March 30, 2022 Hosted by: GBIF Secretariat Licence: CC BY 4.0

126 OCCURRENCES

34 CITATIONS

50 EVENTS

Event ID	Event date	Sampling protocol	Occurrence count
hwp:bifa-fasps:plwn:09-2018:ps04	2 October 2018	Patch Sampling Visual Encounter Survey Timed Survey	8 (0 absent)
hwp:bifa-fasps:plwn:09-2018:op02	25 September 2018	Opportunsitic survey	7 (0 absent)
hwp:bifa-fasps:plwn:09-2018:ps01	27 September 2018	Patch Sampling Visual Encounter Survey Timed Survey	6 (0 absent)
hwp:bifa-fasps:plwn:09-2018:op01	18 September 2018	Opportunsitic survey	5 (0 absent)
hwp:bifa-fasps:plwn:09-2018:ps05	3 October 2018	Patch Sampling Visual Encounter Survey Timed Survey	5 (0 absent)
hwp:bifa-fasps:plwn:09-2018:tr01:p7	25 September 2018	Line transect Visual Encounter Survey	5 (0 absent)
hwp:bifa-fasps:plwn:09-2018:narra	24 September 2018	Opportunsitic survey	4 (0 absent)
hwp:bifa-fasps:plwn:09-2018:ps03	1 October 2018	Patch Sampling Visual Encounter Survey Timed Survey	4 (0 absent)
hwp:bifa-fasps:plwn:09-2018:tr01:p0	No data	Line transect/Visual Encounter Survey	4 (0 absent)
hwp:bifa-fasps:plwn:09-2018:tr03:p9	24 September 2018	Line transect/Visual Encounter Survey	4 (0 absent)

How can I fit my data into existing concepts?

Different cores can be used

- Occurrence core for natural history collection specimens and field observations
- Taxon core taxonomical lists, checklists, red lists
- Event core for sampling events, surveys, transects
- Other origins remote sensing data, maps, audio/video recordings

Choosing a Dataset class takes time



Metadata only dataset

No data content required.

You know what is in your collection and you can describe its content and scope but you cannot make the data content available on GBIF.

Checklist

 Scientific names of organisms sharing a common theme or feature (for example: medicinal use).

Occurrence Dataset

- Scientific names of organisms observed or specimens collected,
- · Observation or sampling date (year),
- Observation or sampling location (at least country).

Sampling-Event Dataset

- Scientific names of organisms observed or specimens collected,
- Sampling date,
- Observation or sampling location,
- Sampling protocol.



Principles of Data Quality

• A vision targeted on data quality

- Use standards
- Seek efficiency and avoid duplicating efforts
- Promote sharing of data
- Think at a larger scale
- Cater to users and their needs
- Invest in documentation and metadata
- A policy implementing this vision
- An implementation strategy for this policy
 - Long and Short-term goals

DATA PROCESSING AND QUALITY WORKFLOW



DATA PROCESSING AND QUALITY RESPONSIBILITIES







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Collector

Legible, accurate and complete labels and logs.

Documentation of collection methods

Clear and unambiguous remarks and feedback.

Transcribers

Accurate data entry.

Performance of regular validation tests and associated corrections.

Regular backup, retention and versioning of database files.

Addressing feedback.

Curator

Providing quality metadata,

Ensuring that quality control and feedback loops occur on a regular basis.

Acknowledging intellectual property rights and ethical sensibilities with respect to the collection and publication of data.

User

Reporting mistakes and omissions in data and documentation.

Providing feedback to define future priorities for collection.

Determining if datasets are fit for their use.

Taxonomic Information

- Even genus and/or family level is useful
- Without taxonomic info, a digitized specimen is useless and can not be properly interpreted
- Be careful with names whether scientific or vernacular
 - Misspelled entries, incorrect identification, wrong format
- Missing or inconsistent data
- Always check Darwin Core terms





Spatial Information

- Geographic information is valuable
- It is recommended to share precise coordinates (Google Earth, ArcGIS, Maptitude)
- NOTE: Geographic information should not always be shared in the context of conserving sensitive species

Coordinates – a code documenting a position on Earth (latitude,

longitude, elevation)

Georeferencing – process of assigning a geographical reference to a given record

Geodatic datum (WGS 84) – a coordinate system; a set of reference points; used to locate places on the Earth



SPATIAL INFORMATION: COMMON MISTAKES TO AVOID

- Coordinates inversion
- Null values
- Unknown datum
- Inadapted SRS
- Conversion issues.

Early GBIF map showing USA data, making evident some common mistakes:

0,0 coordinates (Greenwich meridian and Equator)

Reverse coordinates (mirror effect on China and slight mirror effect west of Chile)

Collection Information: Concepts and Things to Remember

- Collectors' names
- Collection date
- Static collection (museum): collector name, ID, date, habitat, capture technique
- Observation: area, time of day, activity, sex of the specimen
- Sampling-event data: sampling methods, grid size, frequency
- Exactitude: names of collector(s), date, scientific name
- Consistency: use of a controlled vocabulary
- Completeness: some terms are very rarely completed which can impede data use; always try to share as much information as possible, if known

Descriptive Information

- Variable quality
 - Data relative to the whole taxonomic rank and not the specimen in particular
- Completeness
 - Generally impossible to achieve on a given specimen
- Consistency
 - Some traits can be non-consistent



Data Capture Activity

Create a Darwin Core spreadsheet by using the occurrence dataset template
Use the information written on the specimen tags and catalogue sheets

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