





# Diversity Workbench data management system

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Expert Workshop on GBIF Data  
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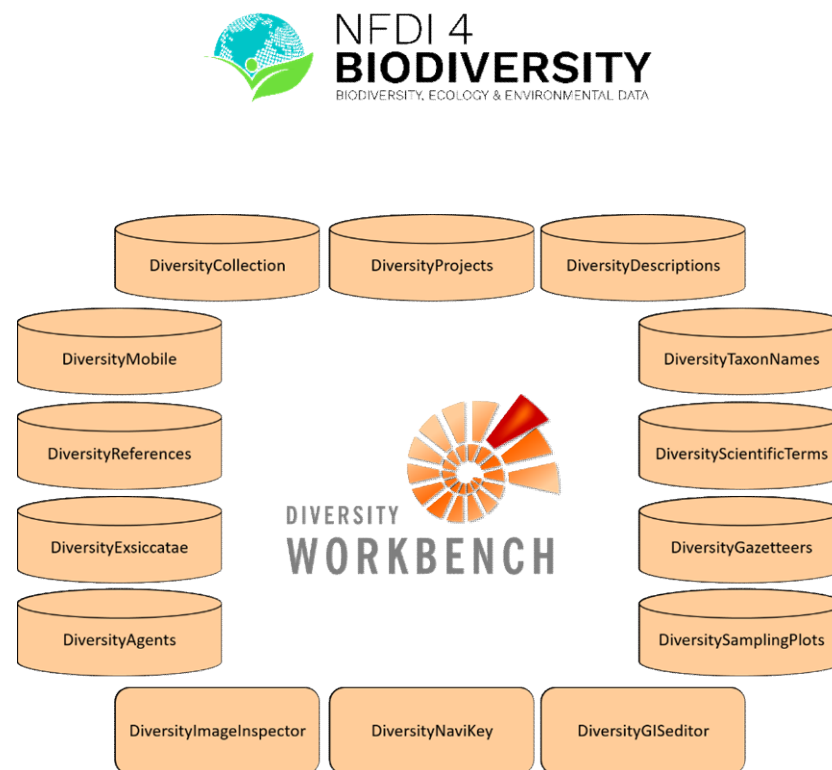
# Technical documentation at a glance

Name and mission of the database framework	Diversity Workbench (DWB)
Software	Diversity Workbench Suite of database applications with client interfaces and supporting data processing tools
DWB first contact persons	T. Weibulat and D. Triebel at the SNSB IT Center <a href="#">↗</a>
Operating system server	MS Windows Server 2012 R2 to MS Windows Server 2019; see Info in <a href="#">Wikipedia en</a> <a href="#">↗</a> and <a href="#">Wikipedia de</a> <a href="#">↗</a>
Database system 	MS SQL-Server 2014 to MS SQL-Server 2017 or MS SQL-Server Express; see Info in <a href="#">Wikipedia en</a> <a href="#">↗</a> and <a href="#">Wikipedia de</a> <a href="#">↗</a>
Clients	C# desktop applications (local clients), PWA – Progressive Web Application DiversityNavKey (browser-based), several web APIs
Operating system local clients	MS Windows 8 to MS Windows 11; see Info in <a href="#">Wikipedia en</a> <a href="#">↗</a> and <a href="#">Wikipedia de</a> <a href="#">↗</a>
GIS functionalities	DiversityGisEditor, management of geometry and geography data
GUIs for data import	Import Wizards, txt, CSV, xml in various schemes, xml/xslt, shapes in ESRI-Format
GUIs for data export/ reports	Export Wizards, txt, CSV, xml in various schemes, xml/xslt, shapes in ESRI-Format
GUI language	default: english (multilingual through translation tables)
Open access 	DWB software download
Open source 	DWB SVN code repository <a href="#">↗</a> , SNSB DWB GitHub repository <a href="#">↗</a> ; see also <a href="#">DWB code statistics</a>
Licenses	<a href="#">GNU General Public License 3.0 – GPLv3</a> <a href="#">↗</a>
Information models online	<a href="#">DWB data models and dwb database schemes</a>
State of development 	since 1999, ongoing
Code language, developer platform	C#, .Net Framework 4.8 (.Net Framework 3.5 for older client software); see Info in <a href="#">Wikipedia en</a> <a href="#">↗</a> and <a href="#">Wikipedia de</a> <a href="#">↗</a>
User manuals and videos	under <a href="#">DWB user manuals</a> , <a href="#">DWB video tutorials</a> and with the download of the respective applications in the <a href="#">DWB Wiki</a>
Training	<a href="#">DWB workshops</a> <a href="#">↗</a> and <a href="#">Training materials</a> for basic users, intermediate, advanced, expert users and database administrators
ELIXIR bio.tools	<a href="#">DWB software in bio.tools</a> <a href="#">↗</a> : Technical profile of DWB tools

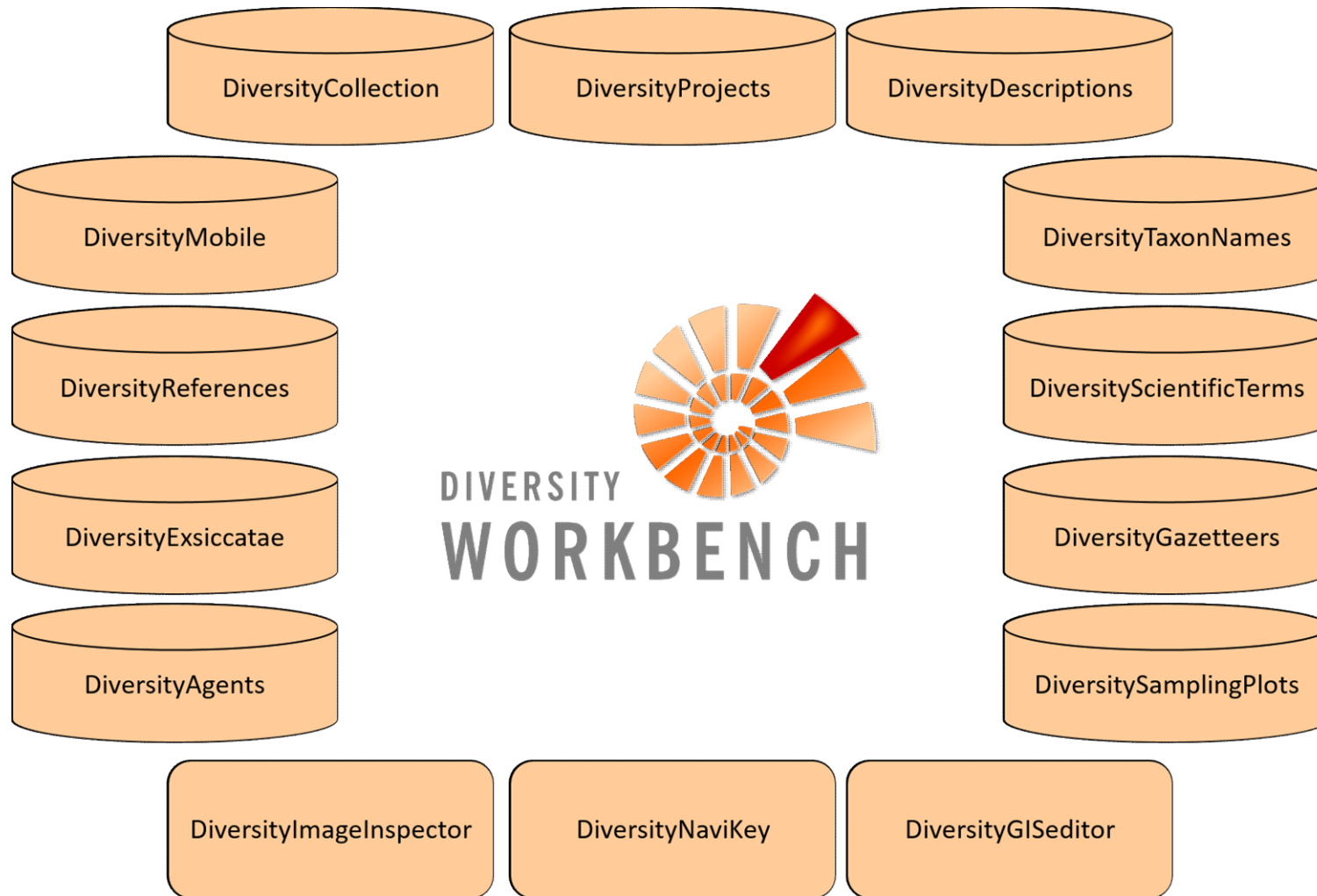
[https://diversityworkbench.net/Portal/Technical/documentation/at\\_a\\_glance](https://diversityworkbench.net/Portal/Technical/documentation/at_a_glance)

# DWB Software development and training

- 3 developers in Munich
- DWB training is offered
- by 5 NHCs / GBIF subnodes
  - SNSB, LIB/ZFMK, SMNK, SMNS,
- and via NFDI4Biodiversity

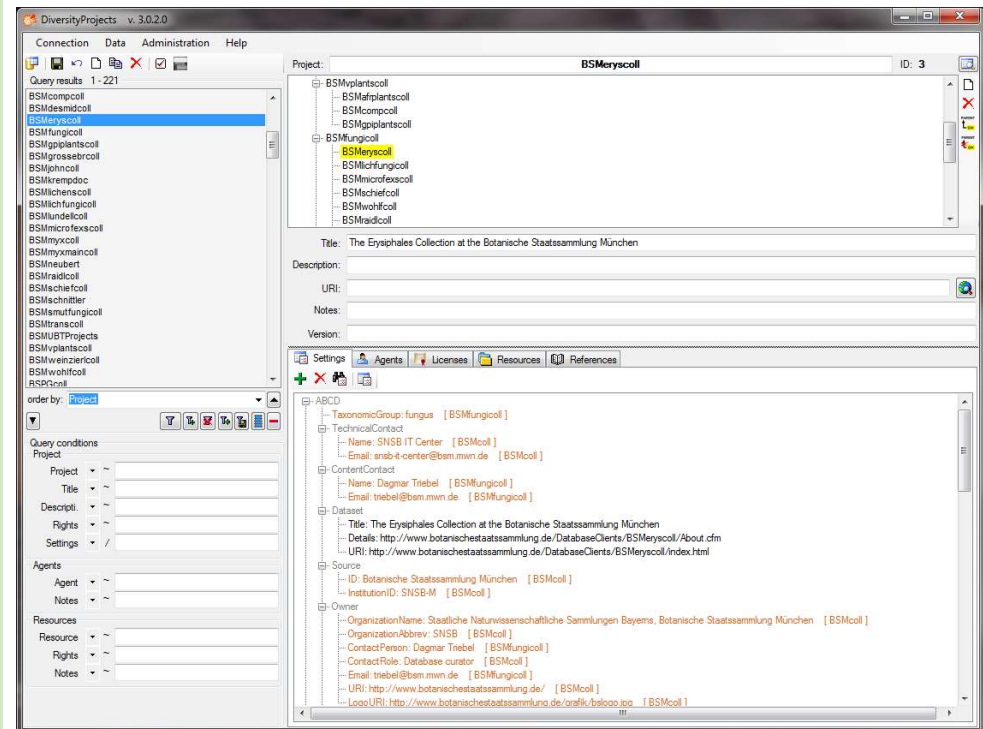


# DWB Modules



# DiversityProjects

- management of research projects and data sets defined and used by components of the Diversity Workbench
- designed to document basic information about the data sets, their relations and hierarchy
- all metadata on data set level are processed here, e.g. data set owner, licenses

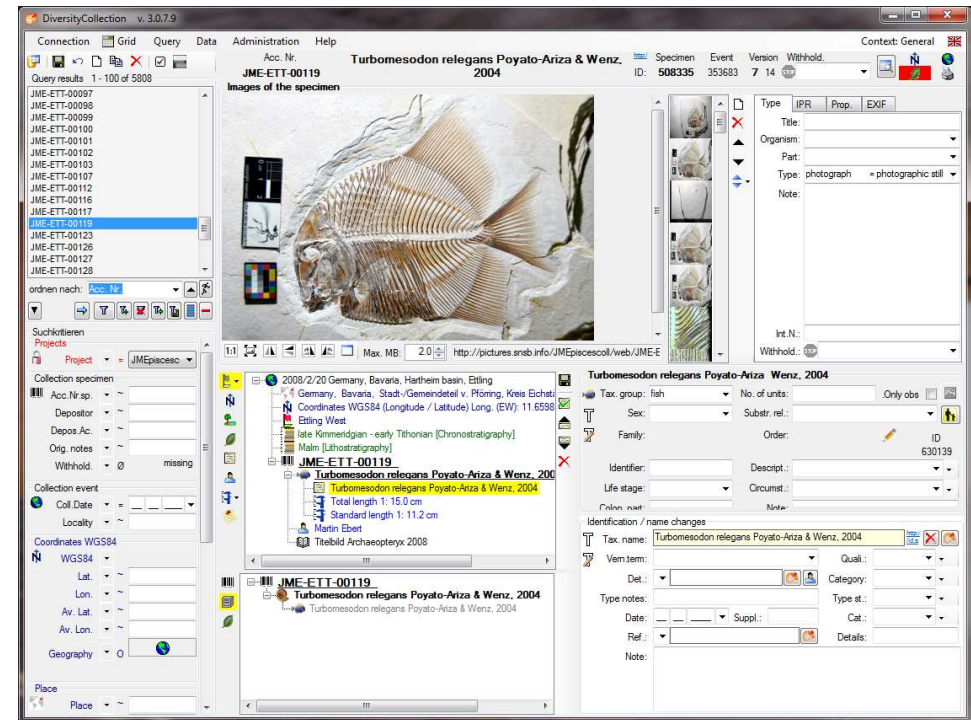


# DiversityProjects – Metadata in GBIF

The screenshot shows the GBIF Occurrence Dataset page for 'Occurrence Data of Vascular Plants collected or compiled for the Flora of Bavaria'. The page features a green navigation bar at the top with links for 'Get data', 'How-to', 'Tools', 'Community', and 'About', along with search and login icons. The main content area includes the dataset title, publication information ('Published by Staatliche Naturwissenschaftliche Sammlungen Bayerns'), and navigation tabs for 'DATASET', 'METRICS', 'ACTIVITY', 'DOWNLOAD', and 'HOME PAGE'. A summary box displays '7,183,903 OCCURRENCES' and '606 CITATIONS'. Below this, a URL is provided: [https://wiki.bayernflora.de/web/Flora\\_of\\_Bavaria\\_-\\_occurrence\\_data\\_online](https://wiki.bayernflora.de/web/Flora_of_Bavaria_-_occurrence_data_online). A logo for 'FLORA VON BAYERN' is shown with the note 'Metadata last modified: March 16, 2021'. A sidebar on the left lists navigation options: 'Description', 'Contacts', 'Data description', 'GBIF registration', and 'Citation'. The main content area has sections for 'Description' (with the same URL) and 'Contacts', which lists two contact points: 'Staatliche Naturwissenschaftliche Sammlungen Bayerns – SNSB IT Center, München' (Technical point of contact: [snsb-it-center@snsb.de](mailto:snsb-it-center@snsb.de)) and 'AG Flora von Bayern' (Administrative point of contact: [bayernflora@snsb.de](mailto:bayernflora@snsb.de)).

# DiversityCollection

- management of collection and observation data
- to document data about
  - collection events
  - collection objects/ observations
  - experiments and analyses
  - object transfer/ exchange
  - preparation and storage of specimens
  - multimedia files
- labels can be printed
- distribution maps can be created



# DiversityCollection data in GBIF

SEARCH OCCURRENCES | 7,183,903 RESULTS

TABLE GALLERY MAP TAXONOMY METRICS DOWNLOAD

Scientific name	Country or area	Coordinates	Month & year	Occurrence status	Basis of record
<i>Crocus sieberi</i> subsp. <i>sublimis</i> (Herb.) B.Ma.	Germany	48.3N, 13.3E	2023 March	Present	Preserved s
<i>Tsuga heterophylla</i> (Raf.) Sarg.	Germany	48.4N, 11.7E	2022 February	Present	Human obs
<i>Asperugo procumbens</i> L.	Germany	49.8N, 9.9E	2022 March	Present	Human obs
<i>Campanula rapunculoides</i> L.	Germany	49.8N, 9.9E	2022 March	Present	Human obs
<i>Corydalis cava</i> (L.) Schweigg. & Körte	Germany	49.8N, 9.9E	2022 March	Present	Human obs
<i>Ficaria</i> Huds.	Germany	49.8N, 9.9E	2022 March	Present	Human obs
<i>Parietaria judaica</i> L.	Germany	49.8N, 9.9E	2022 March	Present	Human obs
<i>Gagea lutea</i> (L.) Ker Gawl.	Germany	50.0N, 10.2E	2022 March	Present	Human obs
<i>Gagea minima</i> (L.) Ker Gawl.	Germany	50.0N, 10.2E	2022 March	Present	Human obs
<i>Gagea lutea</i> (L.) Ker Gawl.	Germany	50.0N, 10.2E	2022 March	Present	Human obs
<i>Gagea minima</i> (L.) Ker Gawl.	Germany	50.0N, 10.2E	2022 March	Present	Human obs
<i>Gagea pratensis</i> (Pers.) Dumort.	Germany	50.0N, 10.2E	2022 March	Present	Human obs
<i>Adoxa moschatellina</i> L.	Germany	50.0N, 10.4E	2022 March	Present	Human obs
<i>Corydalis cava</i> (L.) Schweigg. & Körte	Germany	50.0N, 10.4E	2022 March	Present	Human obs
<i>Pulmonaria obscura</i> Dumort.	Germany	50.0N, 10.4E	2022 March	Present	Human obs
<i>Holostium umbellatum</i> L.	Germany	49.9N, 10.2E	2022 March	Present	Human obs



# DiversityDescriptions

- management of descriptive data
- To describe
  - traits with values of individual organisms and summarized data for taxa
  - characters of any research items (entities/ objects)
- Descriptions are characterized by a triple structure, e.g. 'item-descriptor-value'

The screenshot displays the DiversityDescriptions software interface. The main window shows a detailed view of a bacterial description for *Aridibacter kavangonensis* Ac\_23\_E3. The interface includes a menu bar (Connection, Edit, Data, Query, Administration, Help), a toolbar, and a query results pane on the left. The main area is divided into several sections:

- Descriptor Table:** A table with columns for Nr, Type, and Descriptor name. The selected row (Nr 21) is a sequence descriptor: "Partial ribosomal sequence 16S".
- Molecular Sequence:** A text area displaying the DNA sequence for the selected descriptor, with a nucleotide length of 1506 and a gap at position 1506.
- Status Data:** A table with columns for x, ID, Status, and Notes. The status for the selected descriptor is "To be checked".

The interface also shows various query conditions and data status filters on the left side, such as "order by: Description" and "Data status".

# DiversityDescriptions data in GBIF

Upcoming...

# DiversityTaxonNames

- management of taxonomic names and related information
- to document taxonomic names with nomenclature, accepted names, synonyms, classification, typification and common names
- is appropriate to create taxon reference lists, checklists with geographical or nature conservation categories as well as with other parameters

The screenshot displays the DiversityTaxonNames software interface, version 3.0.1.5, showing the taxonomic details for *Biatora sylvana* Korb. The interface is divided into several panels:

- Taxon:** Shows the taxonomic name *Biatora sylvana* Korb. with its rank (Species) and author (Korb.).
- Nomenclature:** Displays the taxonomic reference / protologue, including the system (Syst. Lich. Germ.), volume (200), issue (1855), and page (200).
- Hierarchy:** Shows the taxonomic classification, starting from Ascomycota Caval. Sm. down to Biatora sylvana Korb.
- Typification:** Provides details on the type material, including the reference (New reference 1), typification (isoelectrotype (M-0061230)), substrate (M-0061230), and locality.
- Synonymy:** Lists synonyms, with *Lecania hyalina* (Fr.) R. Sant. highlighted as a heterotypic synonym.
- Synonymy overview:** Provides a list of external data sources and their corresponding references, including *Biatora sylvana* Korb., Syst. Lich. Germ.: 200 (1855).

# DiversityTaxonNames data in GBIF

The screenshot shows the GBIF Diversity TaxonNames dataset page. The main title is "Taxon list of pest organisms for IPM at natural history collections compiled at the SNSB". The dataset is registered on October 6, 2023, and published by Staatliche Naturwissenschaftliche Sammlungen Bayerns (SNSB). The authors are Biebl S. and Novoa Sepúlveda C. The dataset contains 218 records. The page includes a navigation bar with links for "Get data", "How-to", "Tools", "Community", and "About". A sidebar on the left lists other datasets: "Taxon list of fungi and f...", "Taxon list of animals wi...", "Taxon list of vascular pl BFL project", and "Taxon list of Hymenopt...". The main content area displays the dataset URL, metadata (last modified October 6, 2023, hosted by SNSB, licensed under CC BY 4.0), and four circular progress indicators: 215 Accepted names, 3 Synonyms, 99% Overlap with GBIF Backbone, and 78% Overlap with Catalogue of Life. Below this, there are sections for "Description" and "Contacts". The "Description" section includes the dataset URL and a "GBIF registration" link. The "Contacts" section lists Stephan Biebl and Carla Novoa Sepúlveda.

Get data How-to Tools Community About Login

CHECKLIST DATASET | REGISTERED OCTOBER 6, 2023

## Taxon list of pest organisms for IPM at natural history collections compiled at the SNSB

Published by [Staatliche Naturwissenschaftliche Sammlungen Bayerns](#)  
Biebl S • Novoa Sepúlveda C

DATASET TAXONOMY METRICS DOWNLOAD HOME PAGE 218 RECORDS

[https://www.diversitymobile.net/wiki/About\\_Taxon\\_list\\_of\\_pest\\_organisms\\_for\\_IPM\\_at\\_natural\\_history\\_collections\\_compiled\\_at\\_the\\_SNSB](https://www.diversitymobile.net/wiki/About_Taxon_list_of_pest_organisms_for_IPM_at_natural_history_collections_compiled_at_the_SNSB)

Metadata last modified: October 6, 2023  
Hosted by: Staatliche Naturwissenschaftliche Sammlungen Bayerns  
Licence: CC BY 4.0  
How to cite DOI 10.15468/eanrzt

215 Accepted names 3 Synonyms 99% Overlap with GBIF Backbone 78% Overlap with Catalogue of Life

Description  
Contacts  
Data description  
GBIF registration  
Citation

Description  
[https://www.diversitymobile.net/wiki/About\\_Taxon\\_list\\_of\\_pest\\_organisms\\_for\\_IPM\\_at\\_natural\\_history\\_collections\\_compiled\\_at\\_the\\_SNSB](https://www.diversitymobile.net/wiki/About_Taxon_list_of_pest_organisms_for_IPM_at_natural_history_collections_compiled_at_the_SNSB)

Contacts  
Stephan Biebl  
Carla Novoa Sepúlveda

Taxon list of fungi and f  
[http://www.diversitymobile.net/like\\_organisms\\_from\\_Germany](http://www.diversitymobile.net/like_organisms_from_Germany)  
Published by Staatliche Naturw  
32.676 records

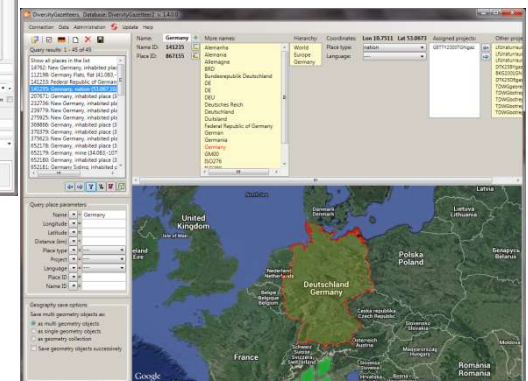
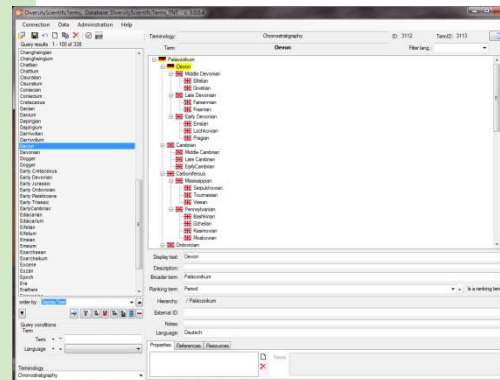
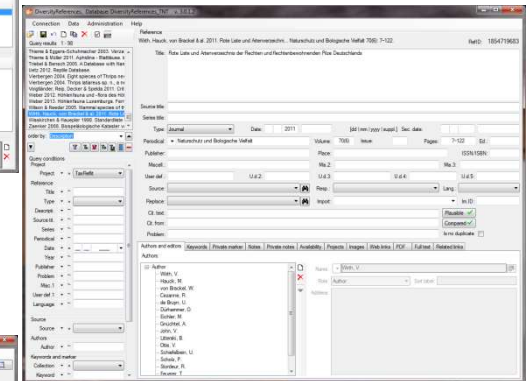
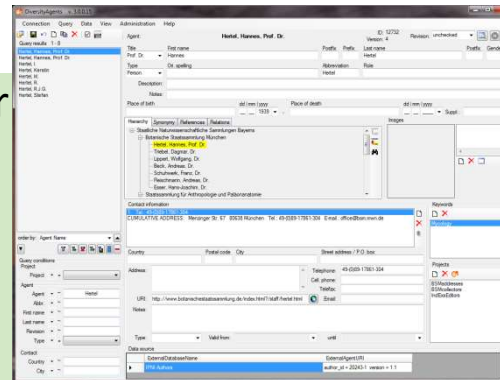
Taxon list of animals wi  
[http://www.diversitymobile.net/wiki/About\\_22Taxon\\_list\\_of\\_](http://www.diversitymobile.net/wiki/About_22Taxon_list_of_)  
Published by Staatliche Naturw  
18.224 records

Taxon list of vascular pl BFL project  
[http://www.diversitymobile.net/wiki/About\\_22Taxon\\_list\\_of\\_](http://www.diversitymobile.net/wiki/About_22Taxon_list_of_)  
Published by Staatliche Naturw  
14.175 records

Taxon list of Hymenopt  
[http://www.diversitymobile.net/wiki/About\\_22Taxon\\_list\\_of\\_](http://www.diversitymobile.net/wiki/About_22Taxon_list_of_)  
Published by Staatliche Naturw  
11.533 records 1 citation

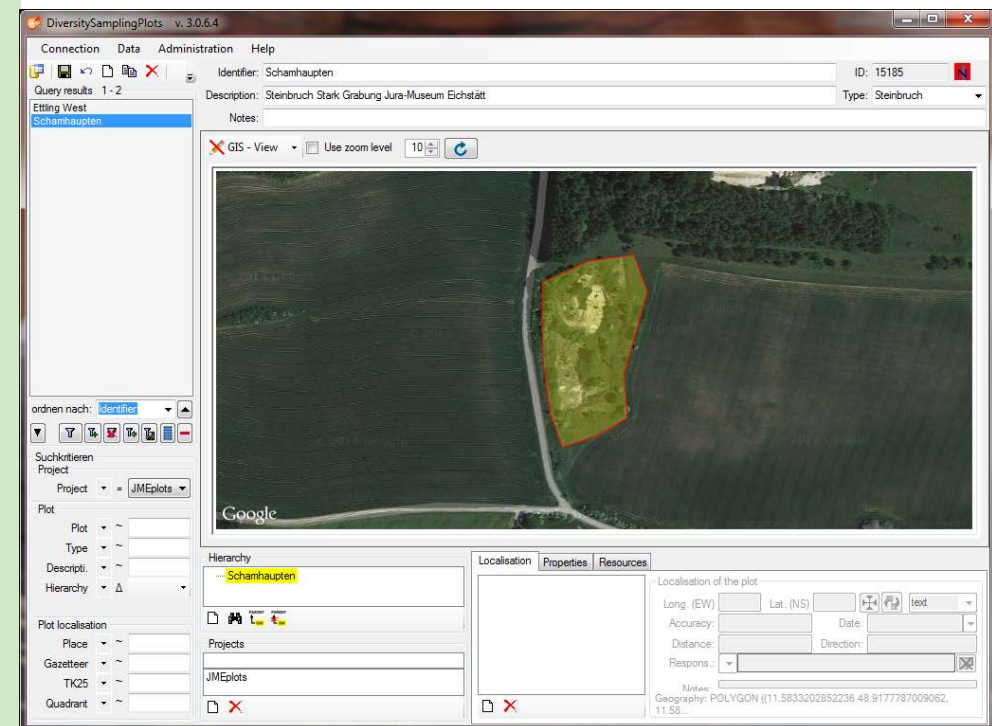
# Ontologies

- DiversityAgents is the component for the management of persons and organisations.
- DiversityReferences is the component for the management of literature references and literature resources.
- DiversityScientificTerms is the component for the management of scientific ontologies, vocabularies, terminologies and terms.
- DiversityGazetteers is the component for the management of geographic thesauri like the GettyThesaurus.



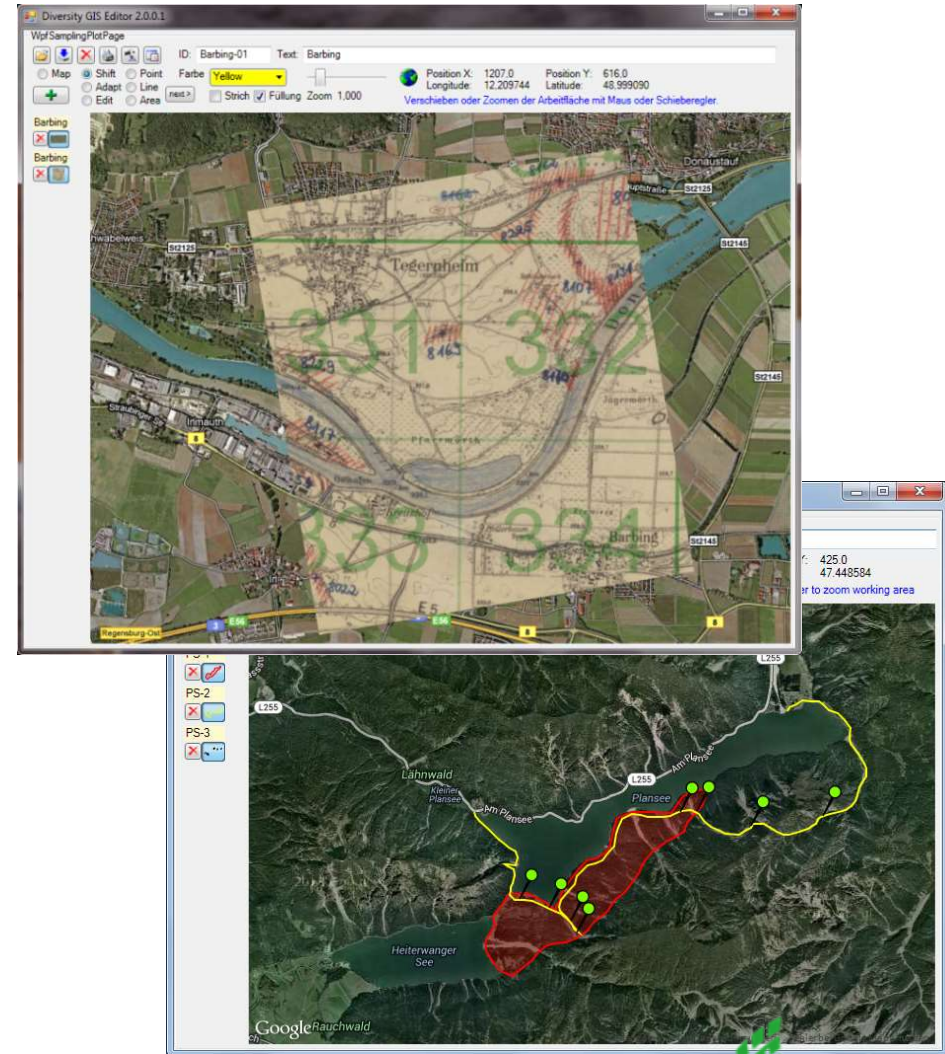
# DiversitySamplingPlots

- management of sampling plots
- to document the geographical position of geobjects and the geometry of the plots as well of georeferenced objects on the plots
- management of the hierarchical relation between plots and subplots

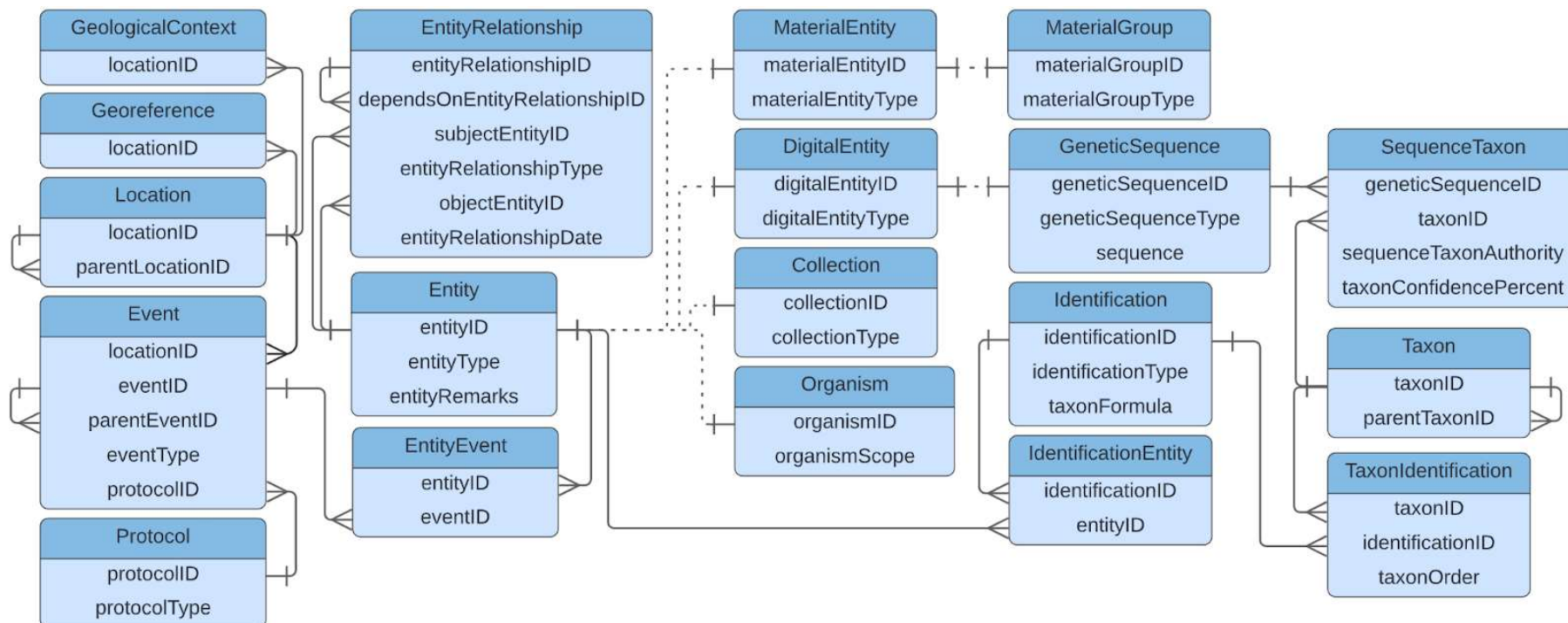


# Diversity GIS Editor

- tool to create, visualize, edit and store samples within a geographical environment (geoobjects)
- stand-alone application or integrated component as part of other DWB applications, e.g. DiversityCollection or DiversitySamplingPlots
- historical maps without coordinates can be georeferenced
- Microsoft SQL Geometry Objects (points, lines and areas) may be displayed and edited with a background map.



# DWB ER diagrams and concepts are compliant with GBIF unified data model



ER Diagram of the basic concepts of the Unified Model, version 2022-09-09, <https://www.gbif.org/new-data-model>





# DWB in numbers

- DWB software tools and applications: 14
- DWB code lines (Mio): 2.2
- DWB installations on servers of the SNSB: 120
- DWB videos: 170
- DWB users (estimated): 350-400
- DWB records managed: 25 mio
- DWB records published (FAIR digital objects): 22 mio

Thank you for your  
attention!