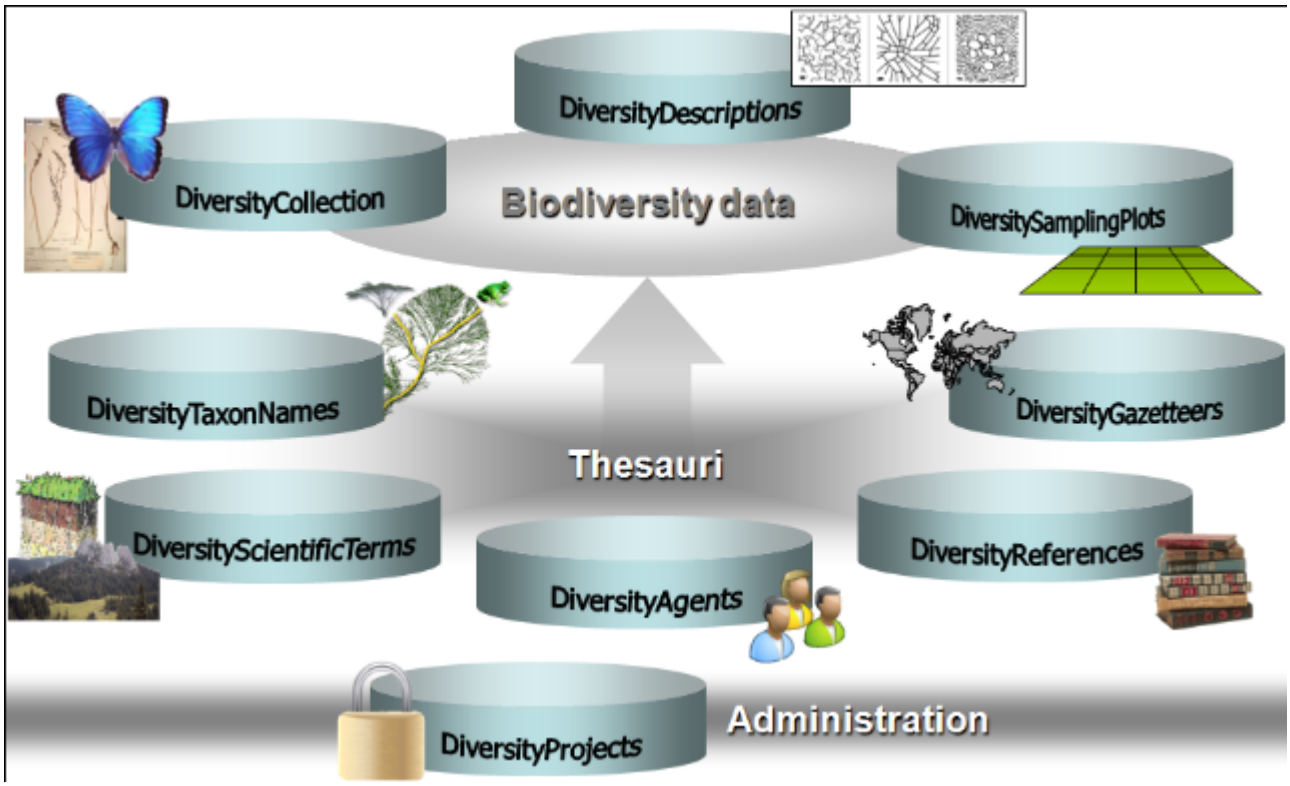
DiversitySamplingPlots

DiversitySamplingPlots is part of the database framework Diversity Workbench. Within this framework the application DiversitySamplingPlots is confined to the display of sampling plots in geographic areas. Any module within the Diversity Workbench is focused on a specific data domain. DiversitySamplingPlots keeps only data regarding sampling plots. Data of other realms like e.g. taxonomy are handled in separate modules.

DiversitySamplingPlots is based on Microsoft SQL-Server 2008 R2 and the .Net Framework, Version 3.5.

For licence and copyright see the licence section.

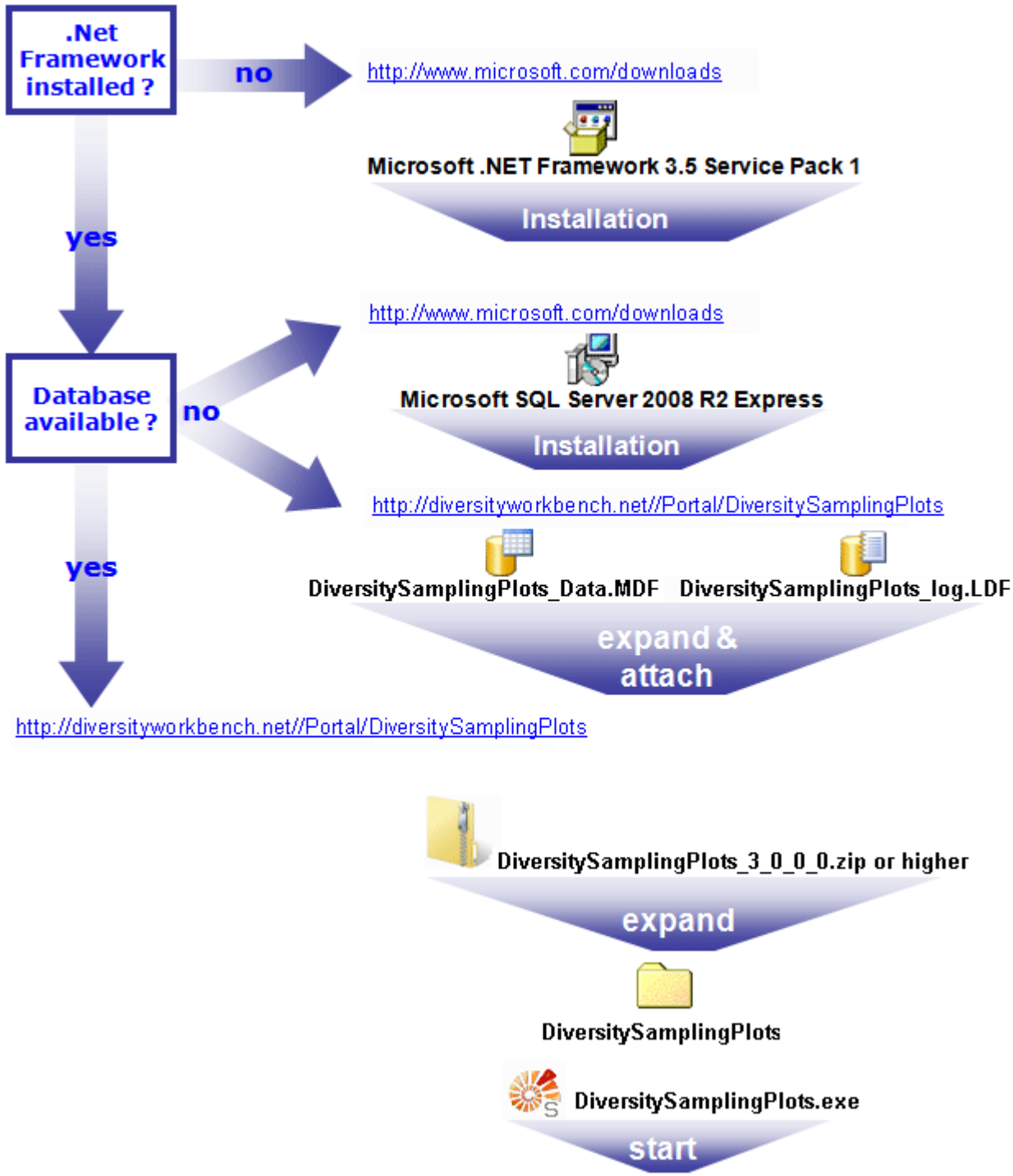
Diversity Workbench modules



Installation

To run DiversitySamplingPlots, you need the database and the client. All parts are free and can be downloaded from http://www.microsoft.com/downloads/ and http://diversityworkbench.net/Portal/DiversitySamplingPlots.

The image below gives an overview of the installations and files needed.



Installation of the database

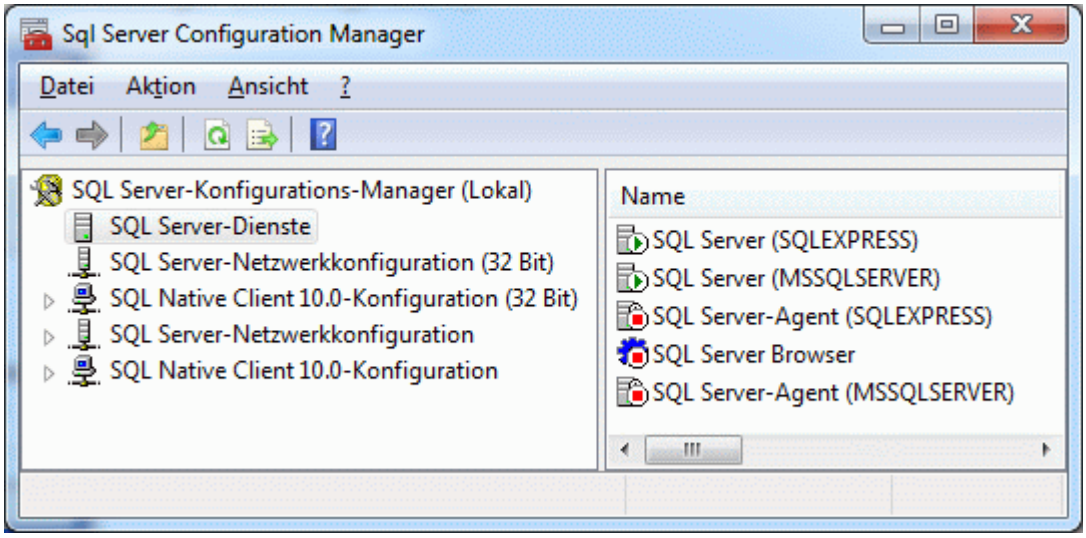
DiversitySamplingPlots uses Microsoft SQL-Server 2008 R2 as database engine. We recommend to use at least Microsoft SQL-Server 2008 R2, because the database files provided at the DiversityWorkbench homepage are generated for this version. You may use a centralized SQL-Server that is accessible by several users, e.g. via a local area network, or run a local database server on your own PC.

If you do not have a database server with DiversitySamplingPlots already available, you have to install the database engine first. Download the free version of Microsoft SQL Server 2008 R2 - Express Edition (e.g. SQLEXPRADV_x86_DEU.exe) from http://www.microsoft.com/downloads/. Start the program and follow the instructions for the installation.

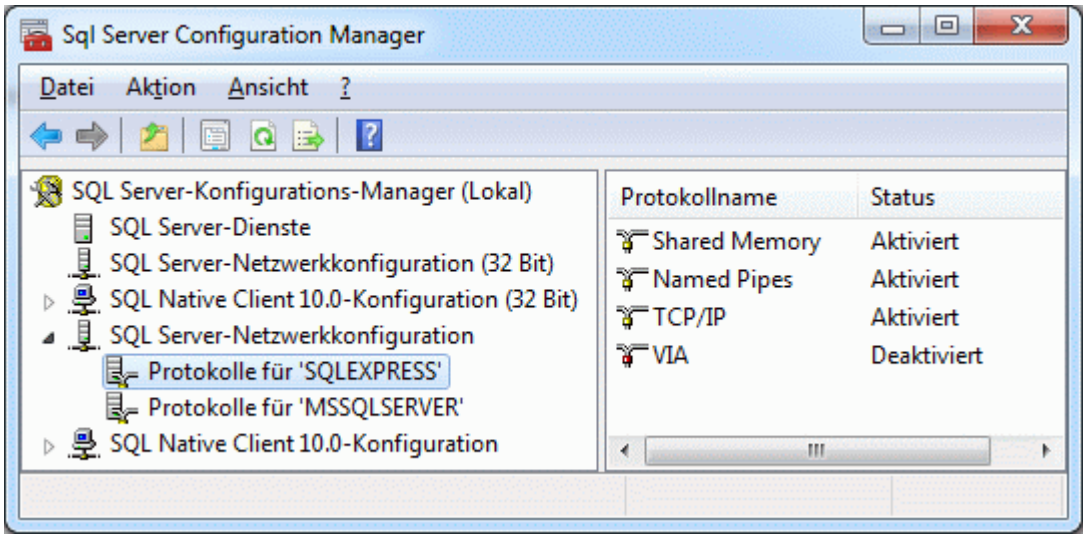
Download the database files DiversitySamplingPlots_Data.MDF and DiversitySamplingPlots_log.LDF from http://diversityworkbench.net/Portal/DiversitySamplingPlots provided as a zip archive and copy them into your database directory.

Server configuration

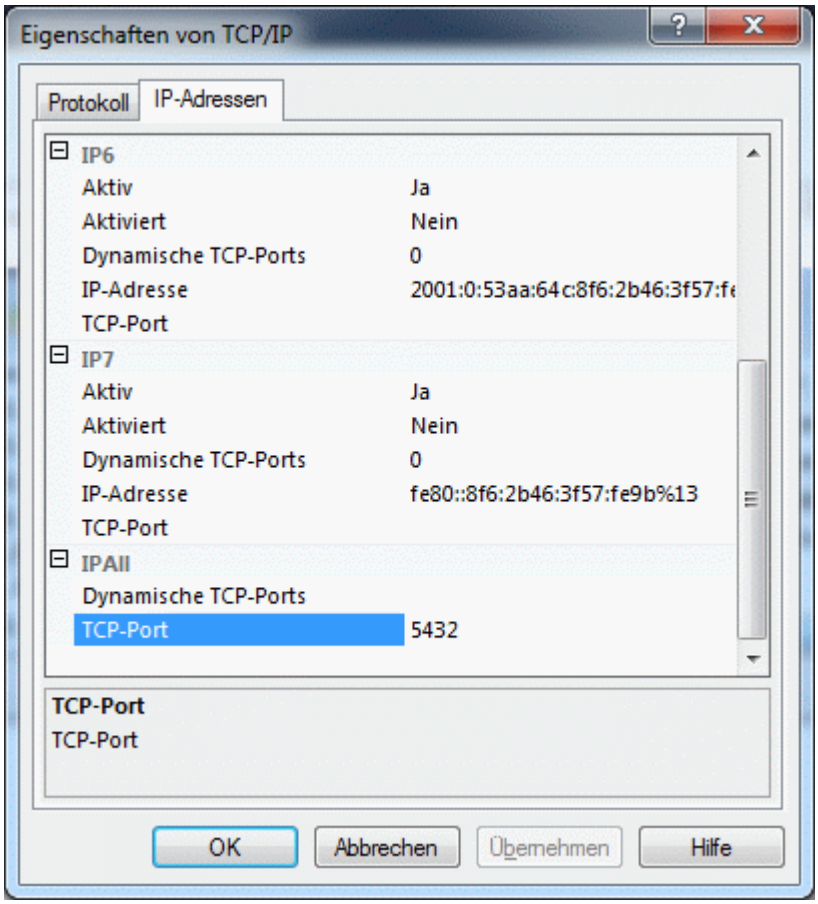
To configure your server for remote access, launch the **SQL Server Configuration Manager** (see image below, in this example two SQL-Server "SQLEXPRESS" and "MSSQLSERVER" are installed).



Then click on the "**Protocols** for SQLEXPRESS" node. Right click on "**TCP/IP**" in the list of Protocols and choose "enable" for TCP/IP.

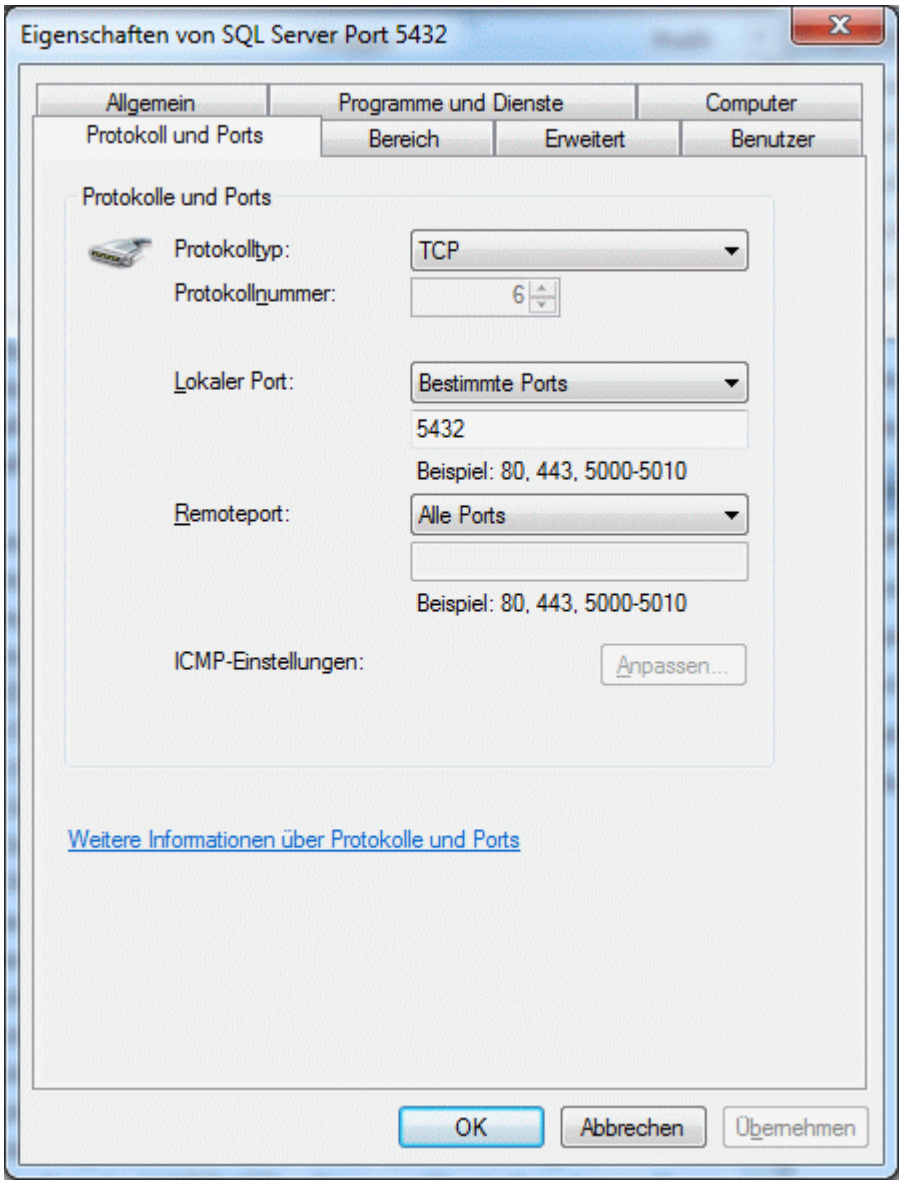


Right click on the TCP/IP node and select "**Properties**" to open a window as shown below.

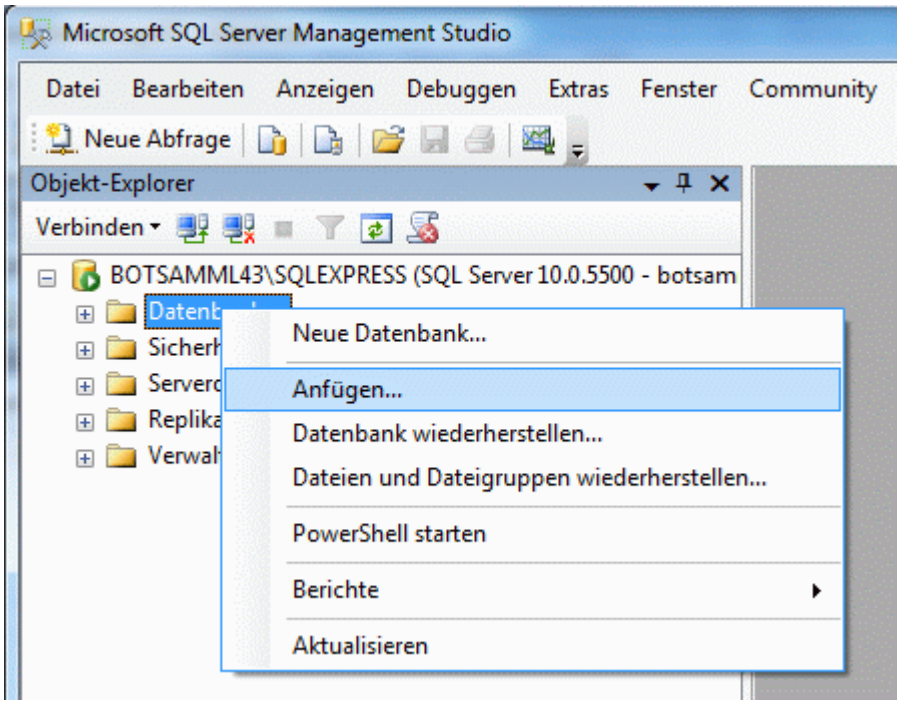


In the part **IPALL** clear out the value for "TCP Dynamic Ports". Give a **TCP-Port** number to use when making remote connections, e.g. "5432" as shown above. You have to restart the SQL Server Express service before you can connect to your database.

If you use a database on a centralized server that shall be reachable over a computer network, make sure that the firewall of the server allows access via the port you set for the connections (see below).



Start the Microsoft SQL Server Managment Studio and attach the database as shown below. Choose the node "databases" and right-click on it to open the context menu (see below). Then choose "attach" from the context menu. A window will open where you can choose the file DiversitySamplingPlots_Data.MDF from your database directory and attach it to the database engine.

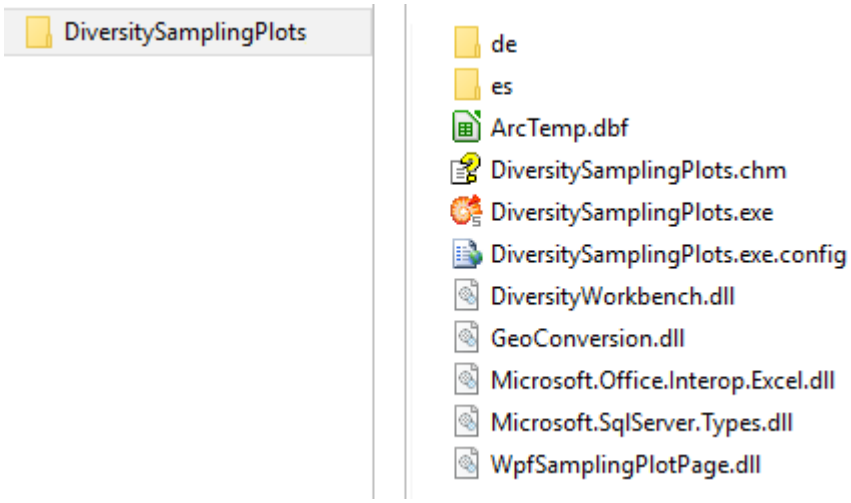


After the installation make sure to get the latest updates from http://windowsupdate.microsoft.com/.

Client installation

The client is based on the .NET framework version 3.5 from Microsoft. If not already present, you have to install the framework first. Download and install the Microsoft .NET Framework 3.5 or higher (e.g. dotnetfx35.exe) - start the program and follow the installation instructions (see http://www.microsoft.com/downloads/ for the latest versions).

Download the files for DiversitySamplingPlots from http://diversityworkbench.net/Portal/DiversitySamplingPlots provided as a zip archive. Extract it and copy all files including subdirectories into your DiversitySamplingPlots directory.



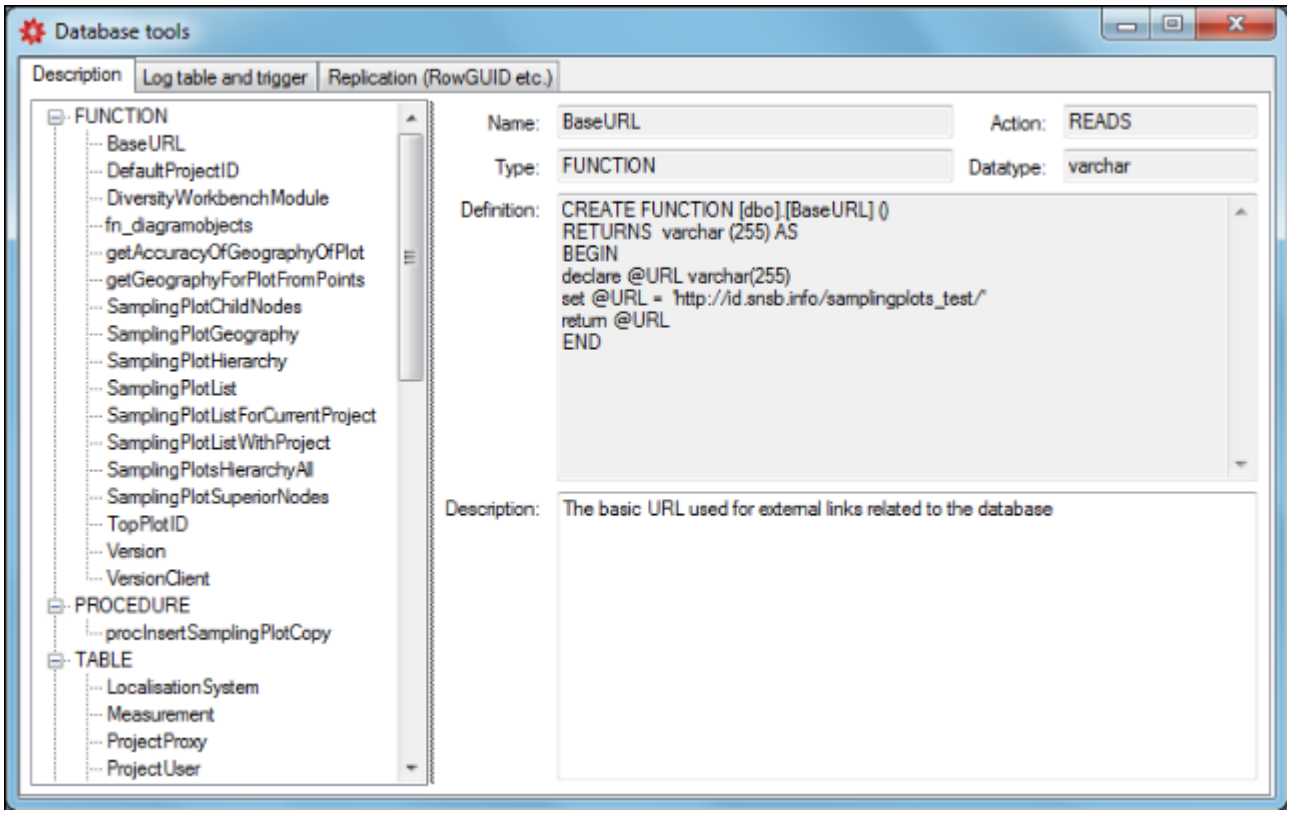
Access to the data

To get access to the data, you have to take several hurdles. In DiversitySamplingPlots you must be a member of one of the user groups. You have only access to those data, that are listed in the projects you have access to.

Database tools

DiversitySamplingPlots provides tools to handle the basic parts of the database. These tools are only available for the owner of the database and should be handled with care as any changes in the database may disable the connection of your client to the database. Before changing any parts of the database it is recommended to **backup** the current state of the database. To use these tools, choose **Administation ->** **Database tools ...** from the menu. A window will open as shown below.

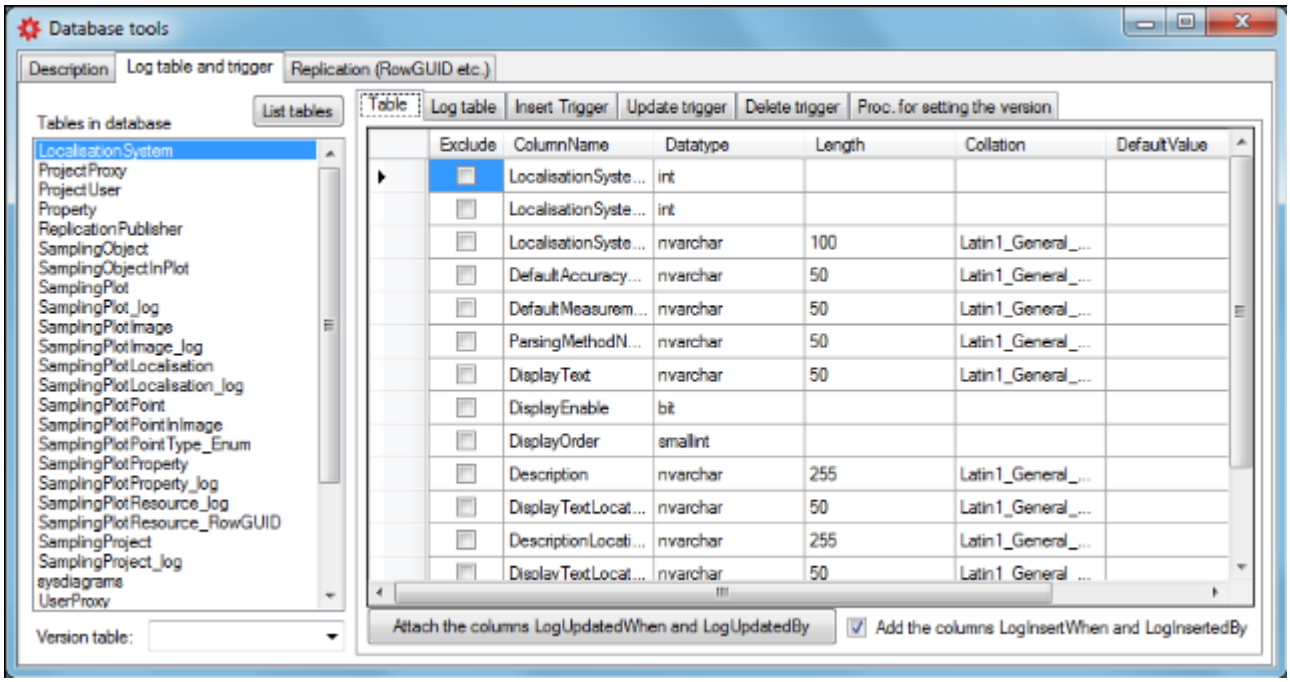
Description



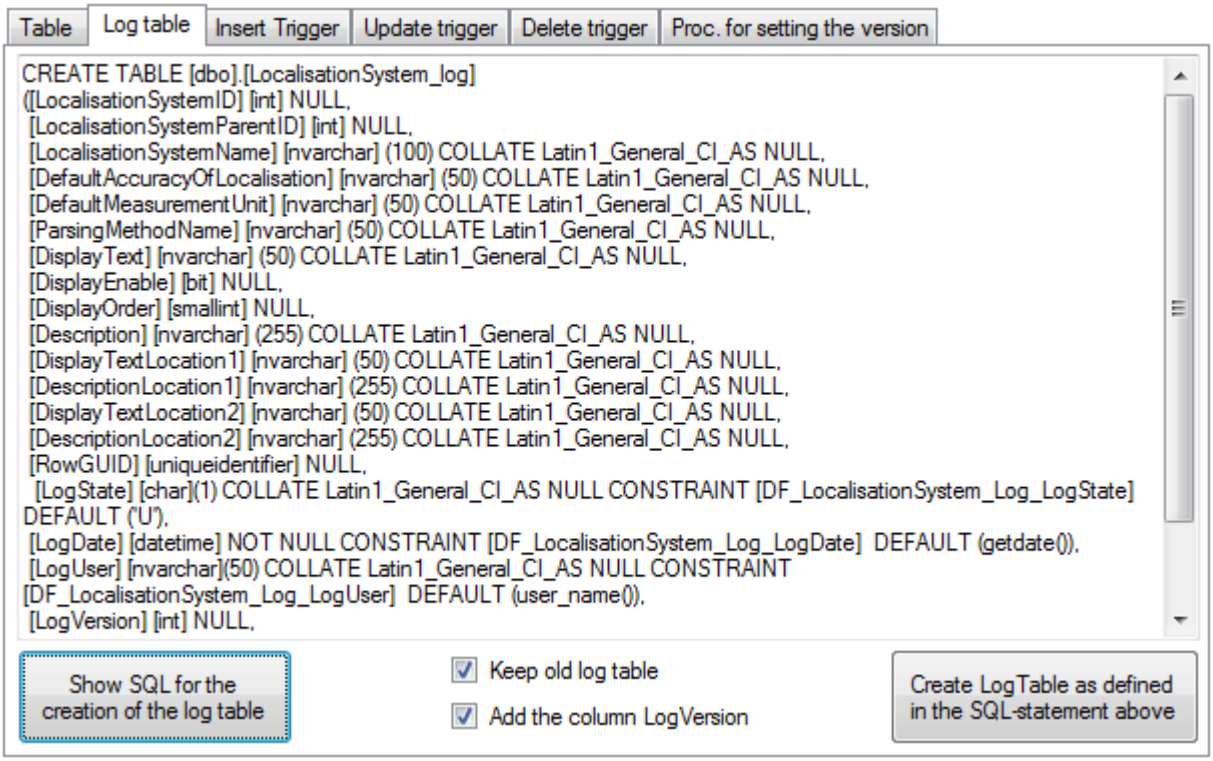
The **Description** section (see above) shows the basic definitions of the objects in the database and enables you to enter a description for these objects.

Log table and trigger

In the **Log table and trigger** section (see below) click on the **List tables** button to see all tables within the database. The **Table** section shows the basic definitions of a selected table. If columns for logging the date and responsible user when inserting and updating the data are missing, you can use the **Attach ...** button to add these columns to the table.

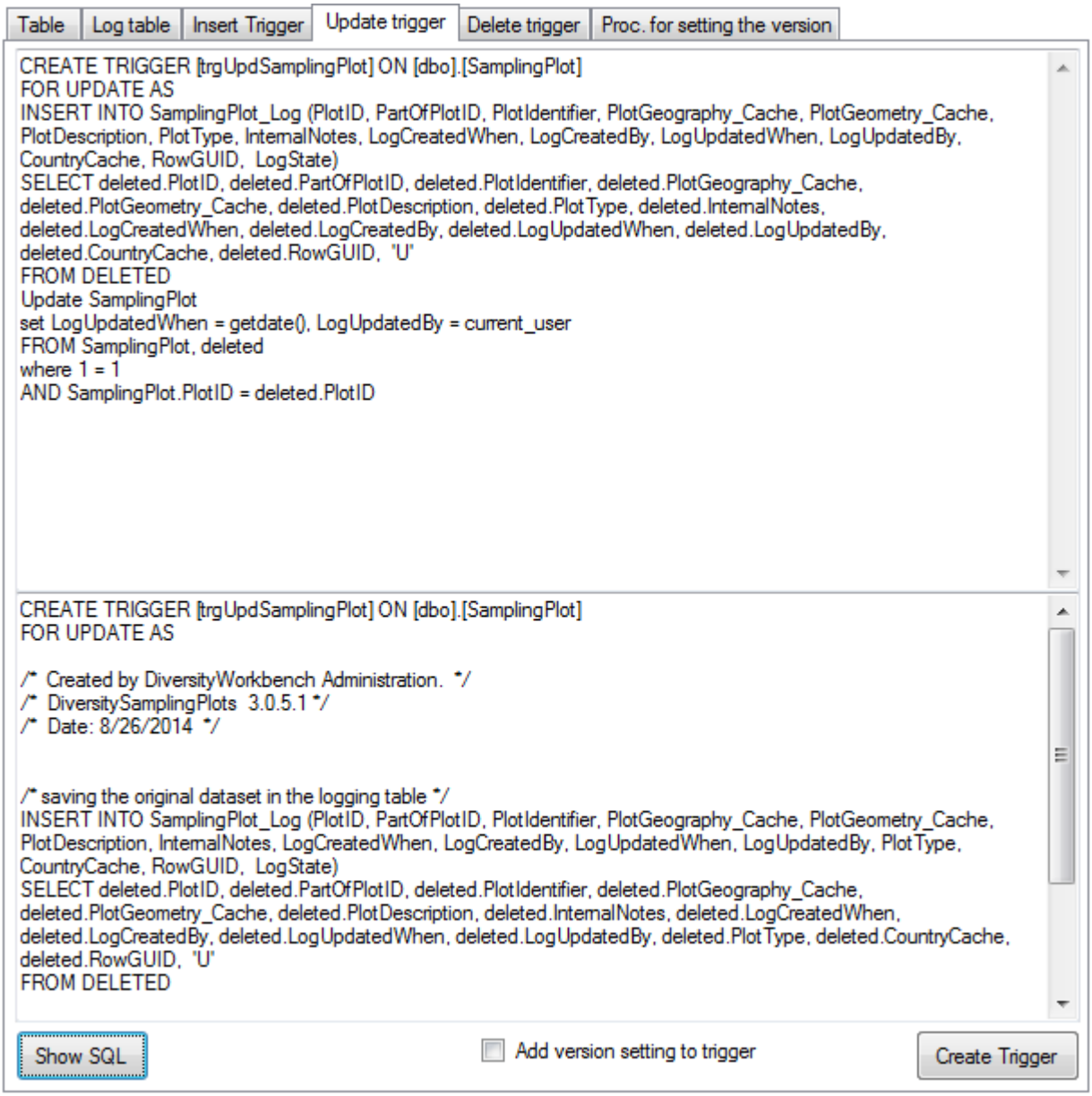


In the **Log table** section (see below) you can create a logging table for the selected table in a format as used within the Diversity Workbench. Click on the **Show SQL ...** button to show the SQL-statement that will create the logging table. If an old logging table should be kept, choose the **Keep old log table** option. If your table should support the version setting from a main table, choose the **Add the column LogVersion** option. To finally create the logging table click on the **Create LogTable ...** button.



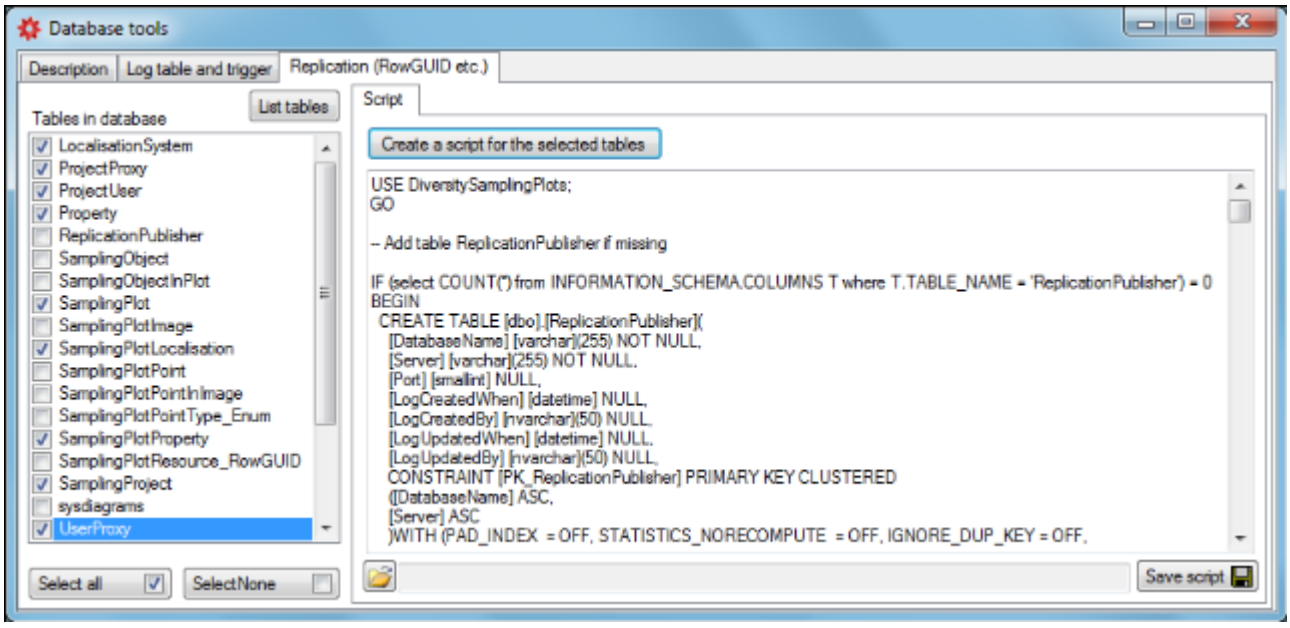
The **triggers** for **insert**, **update** and **delete** are created in the according sections (see below). If an old trigger exists, its definition will be shown in the upper part of the window. Click on the **Show SQL** button to see the definition of the trigger according to the current definition of the table in a format as used in the Diversity Workbench. To finally create the trigger, click on the **Create trigger** button. The update and delete triggers will transfer the original version of the data into the logging tables as defined above, where you can inspect

the history of the data sets.



Preparation for replication

If you want to use replication within your module, the tables need certain columns and a log table. These preparations can be performed by a script, generated in the section **Replication**. Select the tables you want to include in the process and create the script. This script can then be included in an update of the database. Please ensure that these changes are only made by expert staff.


Database tools
Description
Log table and trigger
Replication (RowGUID etc.)
Tables in database
List tables
LocalisationSystem
ProjectProxy
ProjectUser
Property
ReplicationPublisher
SamplingObject
SamplingObjectInPlot
SamplingPlot
SamplingPlotImage
SamplingPlotLocalisation
SamplingPlotPoint
SamplingPlotPointInImage
SamplingPlotPointType_Enum
SamplingPlotProperty
SamplingPlotResource_RowGUID
SamplingProject
sysdiagrams
UserProxy
Select all
SelectNone
Script
Create a script for the selected tables
USE DiversitySamplingPlots;
GO
-- Add table ReplicationPublisher if missing
IF (select COUNT(*) from INFORMATION_SCHEMA.COLUMNS T where T.TABLE_NAME = 'ReplicationPublisher') = 0
BEGIN
CREATE TABLE [dbo].[ReplicationPublisher](
[DatabaseName] [varchar](255) NOT NULL,
[Server] [varchar](255) NOT NULL,
[Port] [smallint] NULL,
[LogCreatedWhen] [datetime] NULL,
[LogCreatedBy] [nvarchar](50) NULL,
[LogUpdatedWhen] [datetime] NULL,
[LogUpdatedBy] [nvarchar](50) NULL,
CONSTRAINT [PK_ReplicationPublisher] PRIMARY KEY CLUSTERED
([DatabaseName] ASC,
[Server] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF,
Save script

Menu

Overview of the menu in DiversitySamplingPlots:

Connection

Database ...	Choose one of the databases available on the server. Only those databases will be listed to which the user has access
Module connections ...	Edit the connections to the other modules within the Diversity Workbench.
Transfer previous settings	Transfer the settings for IP-Address and port of the server, name of the database, login etc. of a previous version of the client to the current version.
Quit	Quit the application and stop all processes started by the application

Data

Backup database ...	Creating a backup of the currently connected database
Import	Import data
Wizard	Import data from tab-separated text files
Sampling plot ...	Import data into SamplingPlots database ...
Replication	Synchronise the content of 2 databases
Add publisher ...	Define a publishing database
<Database> on <Server>	List entry of an added publisher
Download ...	Download data from the data provider and server respectively in your local database
Merge ...	Merge data between the data provider and server respectively and your local database
Upload ...	Upload data from your local database to the replication provider and server respectively
Remove ...	Remove the replication publisher from the list
Clean database ...	Clean your local database

Administration

Projects ...	Administration of the projects
Database ...	Administration of the database
Logins ...	Administration of the users and their permissions in the database
Rename database ...	Rename the currently connected database
Set published DB address ...	Set the base URL address of the currently connected database
Documentation ...	Documentation of the structure of the database
Database tools ...	Database tools

Update

(Only visible, if a new version is available)

Update database ...	Update to a new available database version
Update client ...	Update to a new available client version

Help

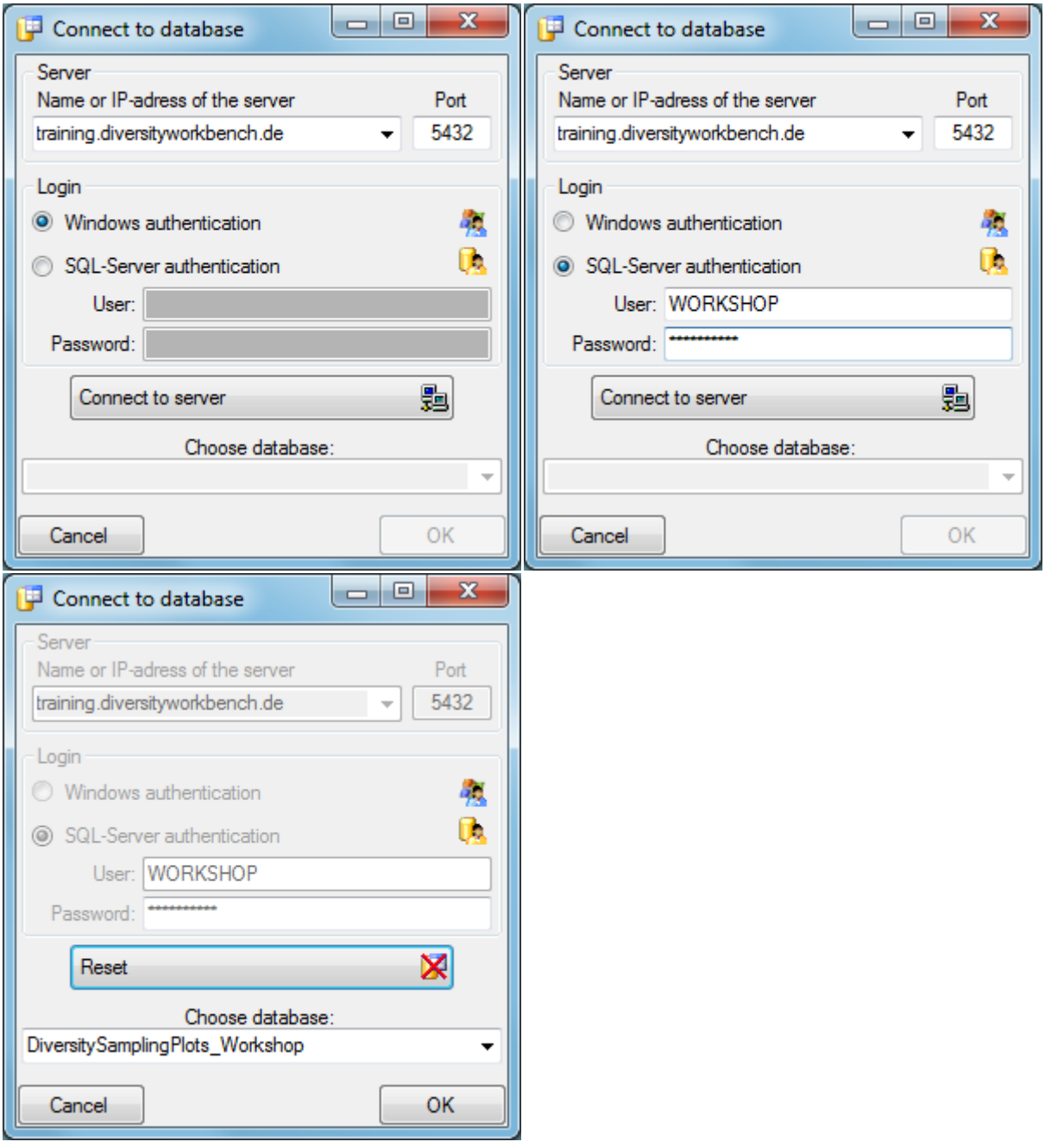
Manual	Opens the online manual
Feedback ...	Opens a window for sending feedback
Feedback history ...	Opens a window for browsing former feedback
Info	Show the version of the program and corresponding information

Server connection and database access

To use a database on a local or remote SQL server, start the program DiversitySamplingPlots.exe. If you are connected to a database this is indicated in DiversitySamplingPlots by the icon of the connection button in the tool bar. If you are not connected the icon will be shown.

To access a database you must specify the server where the database is located. For the configuration of this connection choose **Connection -> Database...** from the menu or click on the button. A dialog window will open. Set the connection parameters as described below.

Specify the name (or IP address) and the port number of the server and select the authentication mode. You can either choose Windows authentication (first image) or SQL-Server authentication (second image).



The standard port number for SQL-Server is 1433 and will be set as a default. If the database server is configured using a port different from that, you must enter the port number in the field Port.

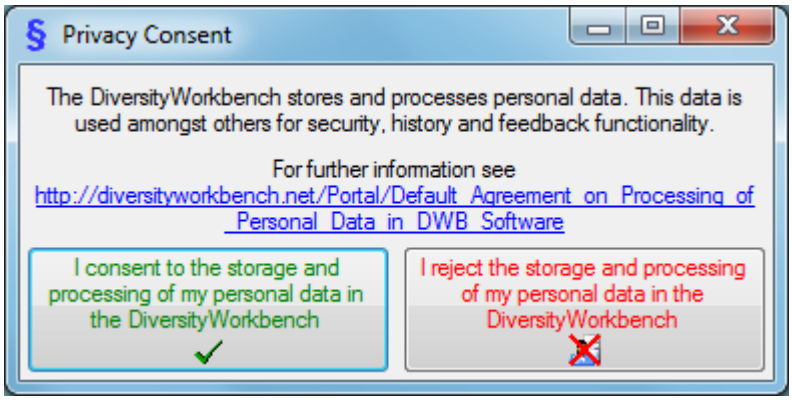
Click on the 

button to connect to the server. If the connection informations are valid, you can choose a database of the server from the combobox at the base of the window (third image).

To restart the connection process click on the 

button.

If you access a database for the first time you will be asked to consent to the storage and processing of your personal data (see below) according to the General Data Protection Regulation. Without your consent the access is not possible.

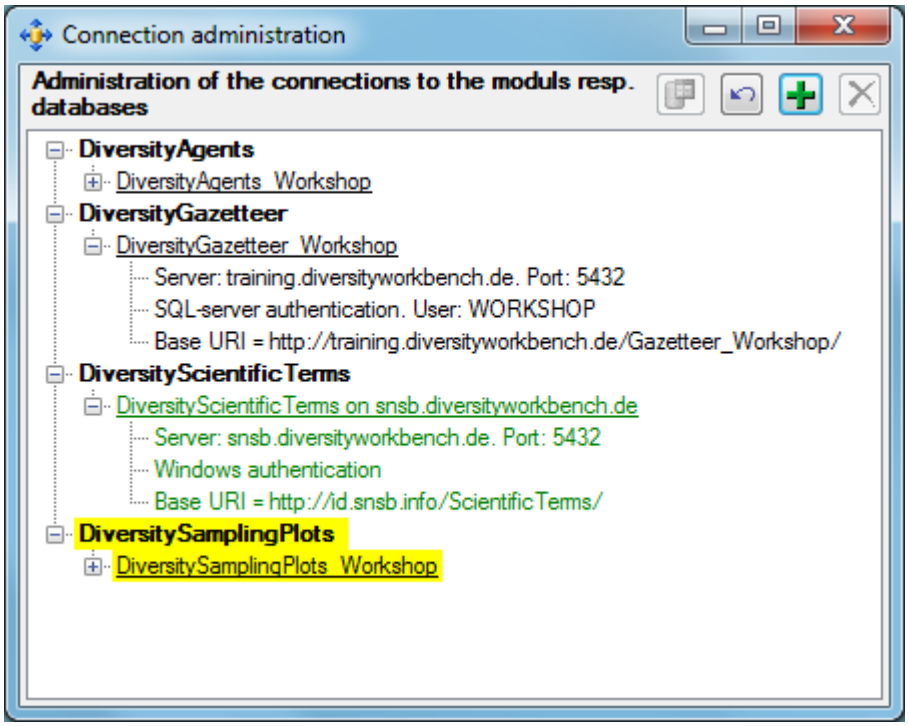


Transfer previous settings

If you had used already a previous version of DiversitySamplingPlots and want to reconnect to the database you had before, you do not have to enter the server and database connection parameters again. Just click on the menu item **Connection ->** **Transfer previous settings** and your settings will be restored automatically.

Connections to the databases and services

The program will automatically try to connect to all the modules within the Diversity Workbench. To edit these connections choose **Connection -> Module connections ...** from the menu. A form as shown below will open, where you can edit these connections.



To edit a connection, select it in the tree and click on the button. To requery the connections use the button. If you want to add a connection on a different server, click on the button and connect to the database you want to add to the list. Added databases will be displayed in green . To remove a connection from the list, select this connection and click on the button. Webservices will be displayed in blue.

Database backup and rename

DiversitySamplingPlots provides several menu options to manage the database which has been connected. When clicking on one of the following entries, a confirmation window will pop up before the task is executed.

Data ->  Backup Database ...

Click on this item to create a backup file of the currently connected database. The backup will be placed on the hard drive of the database server. Be sure that there is enough disk space available for the backup, especially if the server is a virtual device!

Administration ->  Database ->  Rename database

Click to change the name of the currently connected database. If you do this, you will be asked for the base URL address of the database. This is the address that is published by the database for access by other modules. It is recommended to change this URL accordingly, to keep track of it.

Administration ->  Database ->  Set published DB address ...

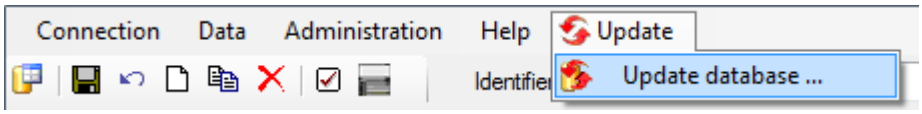
Click to set the base URL address of the currently connected database separately from renaming it.

Renaming of the database and adapting of the published address should be done **before you start to use the database** and name and address should **not be changed afterwards** as datasets from other modules linked to data in the database would point to outdated addresses otherwise.

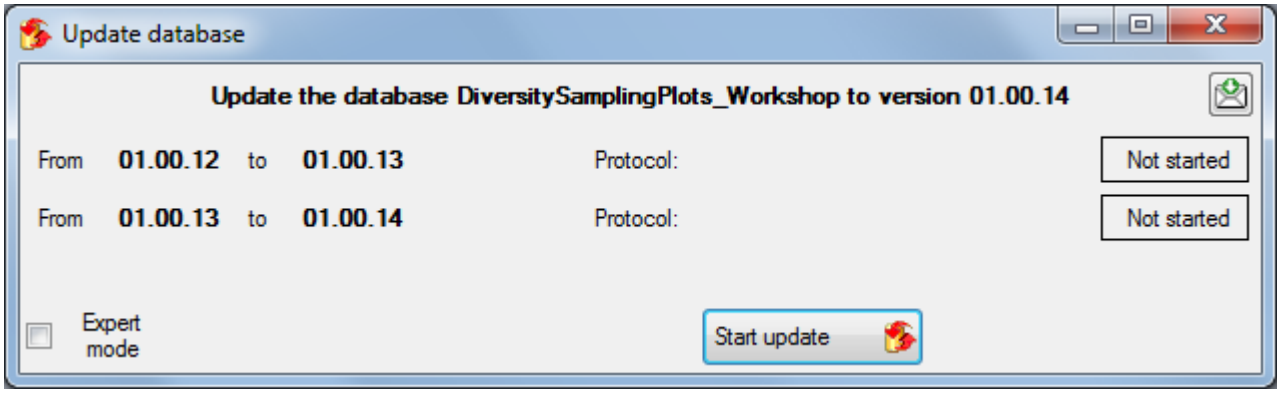
Update of database and client

DiversitySamplingPlots is still in development. Therefore regular updates for the database and the client will be provided. When you start the application and connect to a database, the program will check, if it is compatible with the database or if the database needs an update. It will also check, if a new version of the client is available. In any of these cases an **Update** entry in the menu will appear. Click on it to open the sub menu.

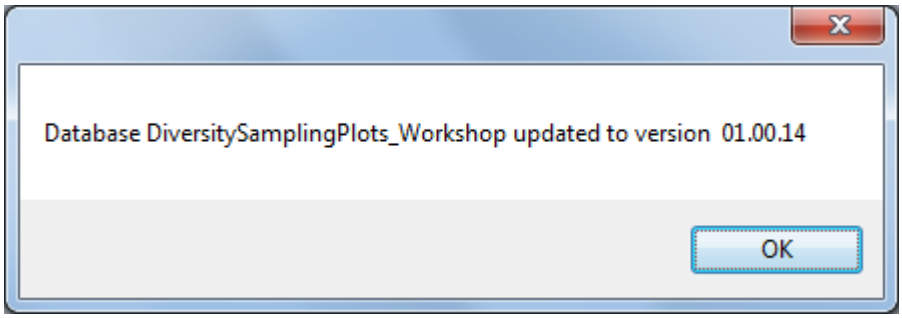
If the database needs to be updated, it will look like this:



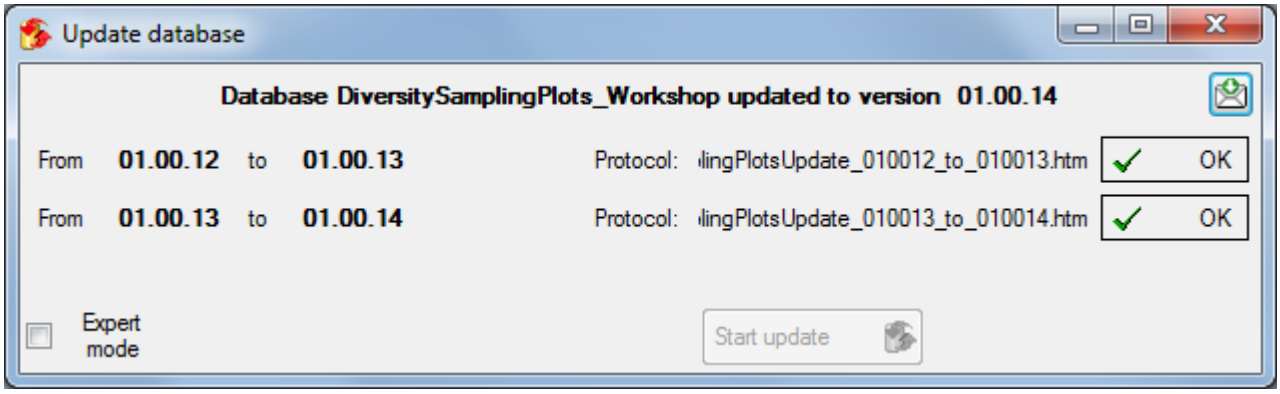
Clicking on **Update database ...** will open an update window as shown below:



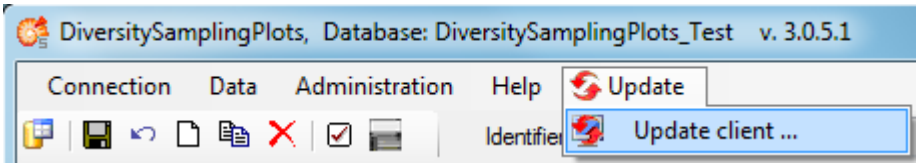
Press the **Start update** button to run the script. If there are multiple update steps shown in the window, these will be processed consecutively. If the database has been updated successfully, there will be a confirmation message



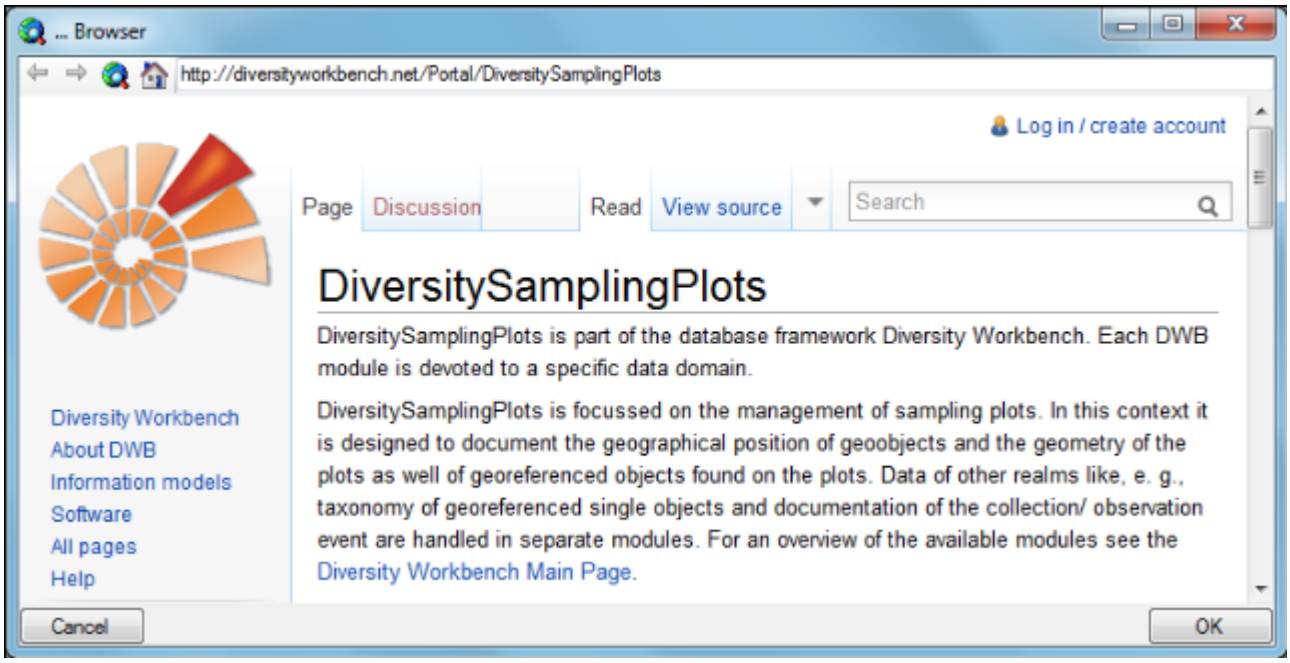
and the window will look like this:



If a new client is available, the sub menu will show an **Update client ...** entry:



Click on it to open the DiversitySamplingPlots software page where you may download the latest version of the application.

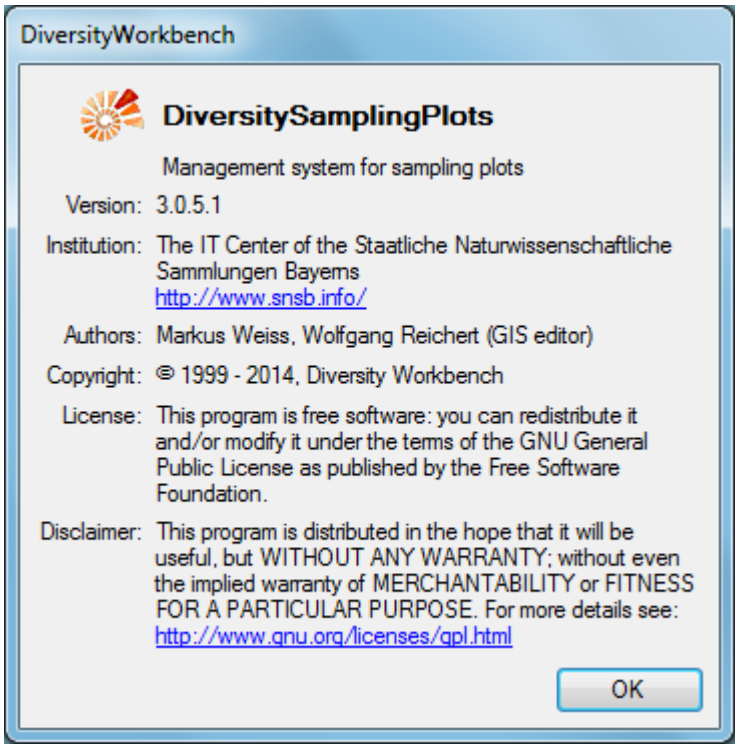


Manual

The online manual DiversitySamplingPlots.chm must be placed in your application folder, together with the application DiversitySamplingPlots.exe. To open this manual and get information to any topic just click within the application DiversitySamplingPlots on the field you need information about and press F1. To open the manual from the menu, choose **Help -> Manual**.

Version

For information about the version of the client application choose **Help -> Info...**



The current version in the example above is 3.0.5.1.

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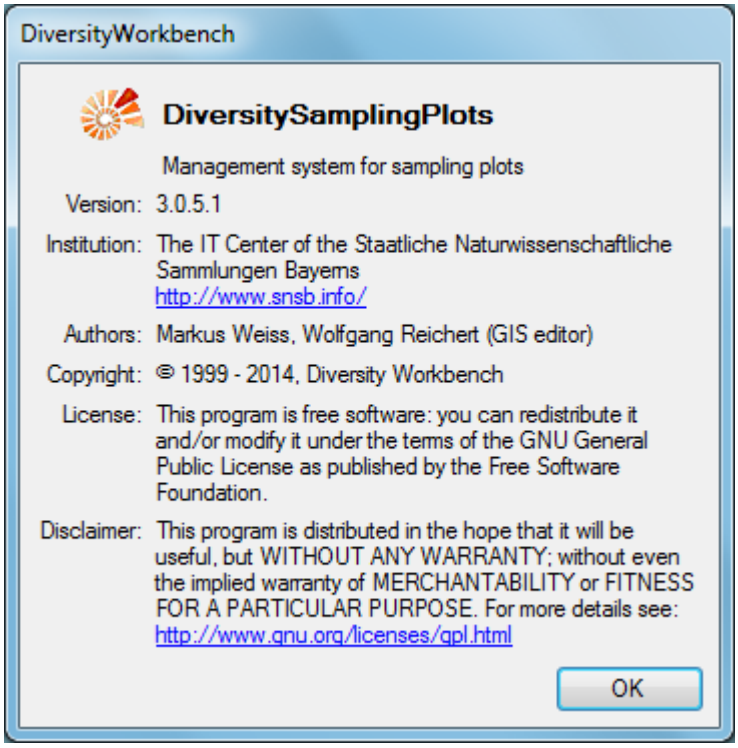
For information about the license of the client software choose **Help -> Info...**



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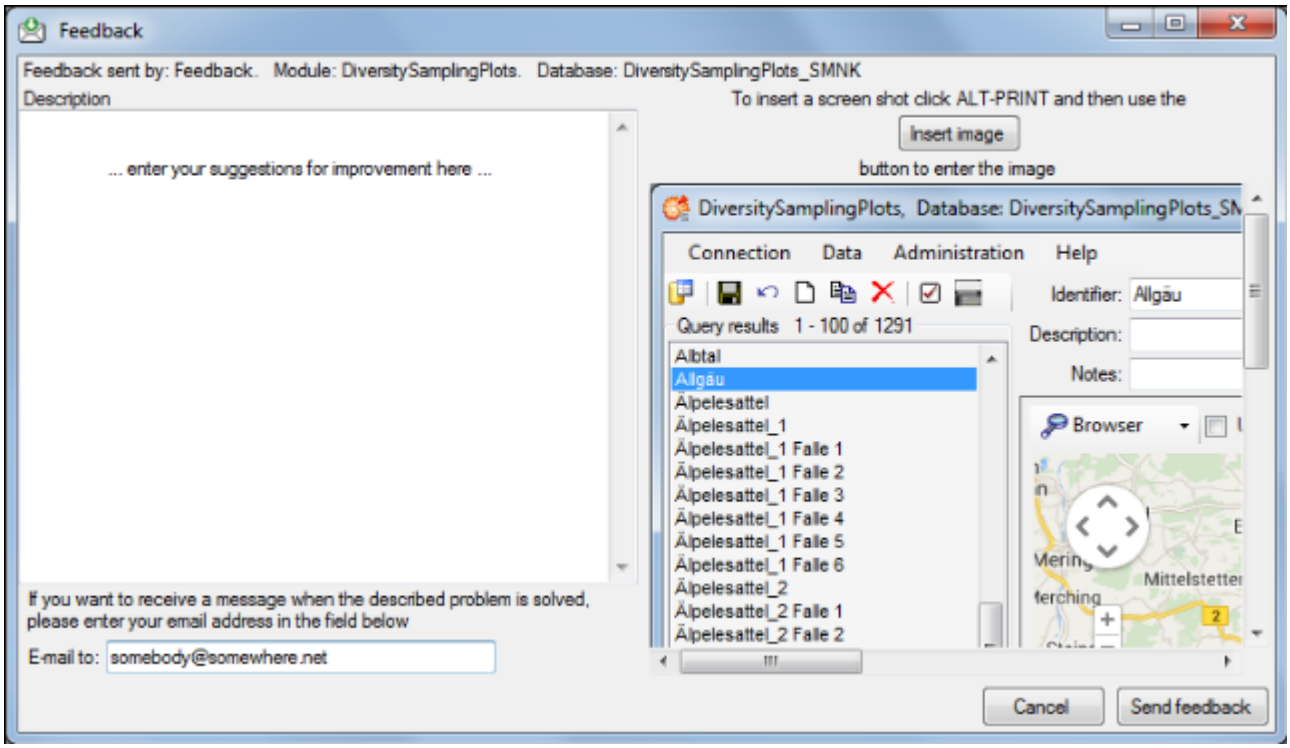
Feedback

If you have suggestions for improvement, need any changes in the program or encounter an error you can give a feedback to the administrator. Click on the [**ALT**] and [**PRINT**] buttons to get a screenshot of your current form. After creating the screenshot choose **Help ->** **Feedback** from the menu to open the feedback window as shown below.



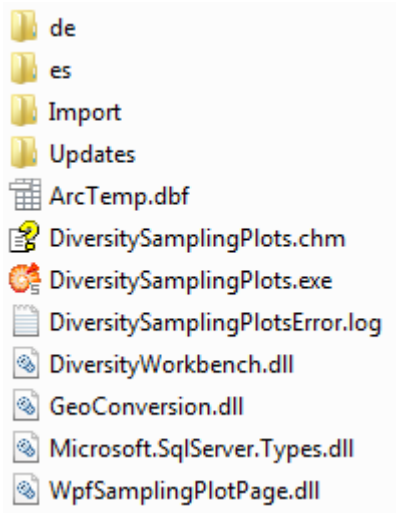
Click on the Insert image button to insert the screenshot and give a comment about your problem. Then click on the Send feedback button to send your feedback to the administrator. If you want to receive a message, when the problem you described is solved, please enter your e-mail address in the field under the description.

To inspect your former feedbacks, choose **Feedback history...** from the menu. A window will open, where you can browse your old feedback together with the state of progress.

If you do not have access to the central database for the feedbacks, the program will open your mail client to send an e-mail. In case of bugs in the program it would help if you attach the file **DiversitySamplingPlotsError.log** located in your application directory (see below).

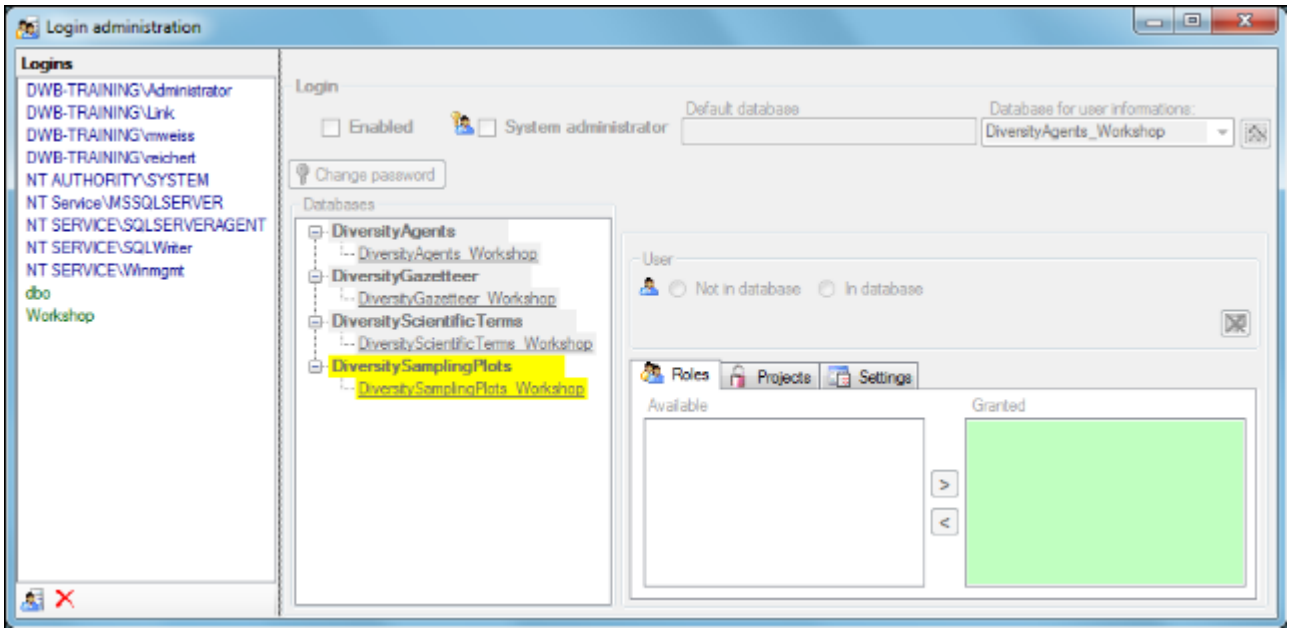
Error logging

If any error messages show up while working with the application you can find further details concerning the part of the application where the error occurred and the parameters involved in the file **DiversitySamplingPlotsError.log** located in your application directory.

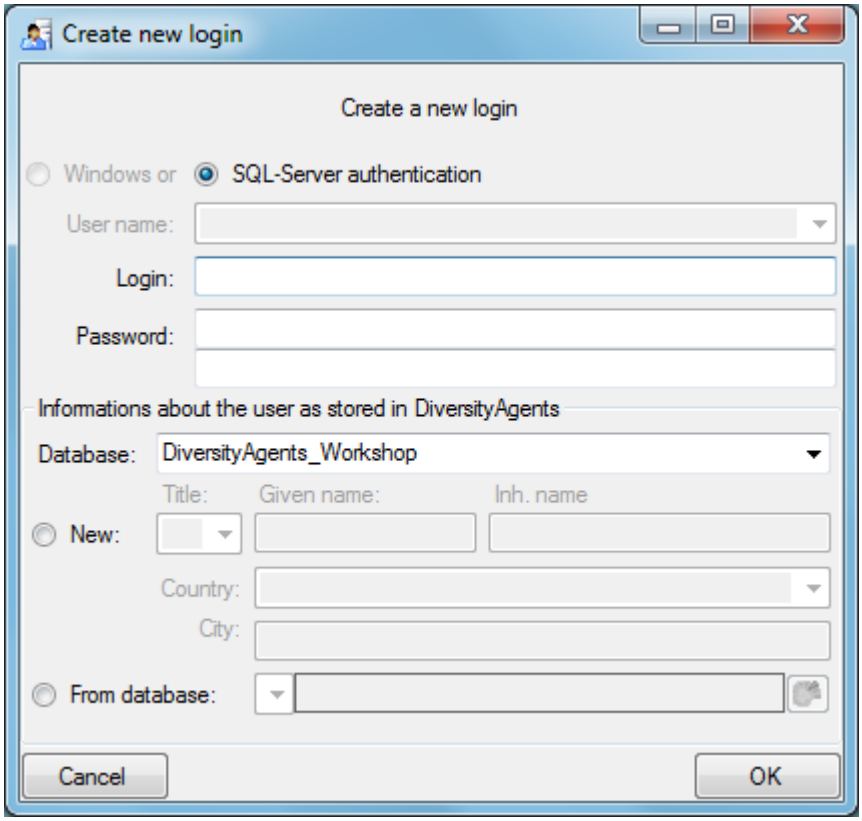

de
es
Import
Updates
ArcTemp.dbf
DiversitySamplingPlots.chm
DiversitySamplingPlots.exe
DiversitySamplingPlotsError.log
DiversityWorkbench.dll
GeoConversion.dll
Microsoft.SqlServer.Types.dll
WpfSamplingPlotPage.dll

Login administration

To administrate the logins on the database server, their permissions resp. roles and access to projects, choose **Administration -> Logins ...** from the menu. A window as shown below will open.

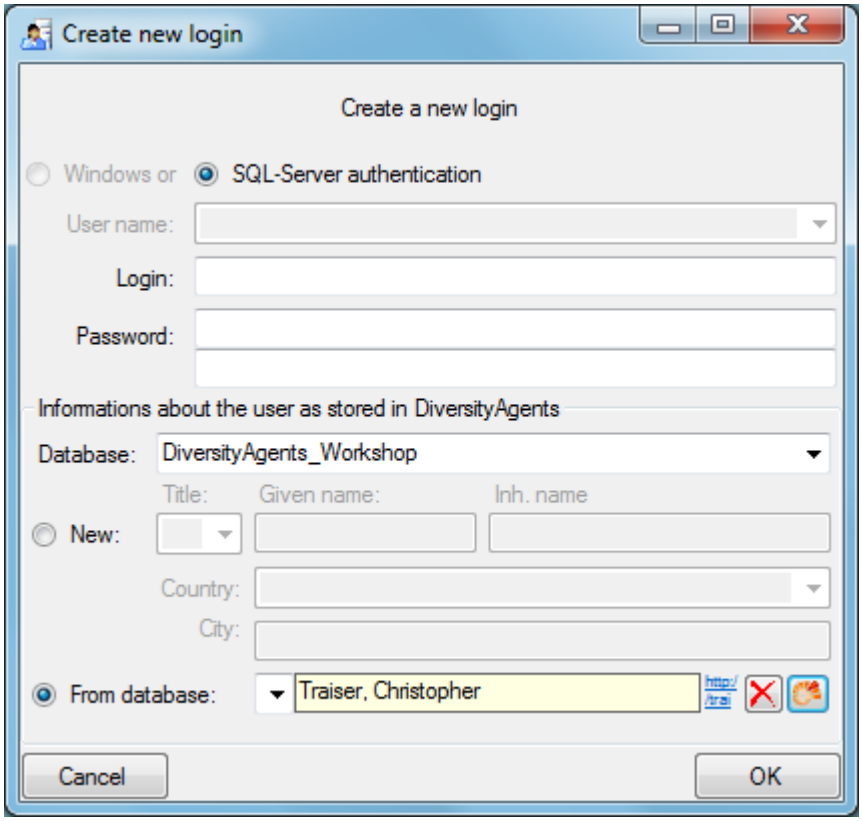


To create a new login, click on the button in the lower left corner. Another window will open.



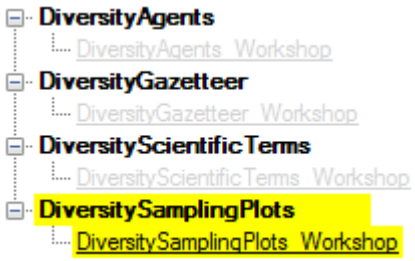
Here you can enter the name of the new login, the password and the informations about the user which will be stored in a DiversityAgents database. Either create a new entry in this database or select an existing one: Click on the button to search for a name in the

database (see below).

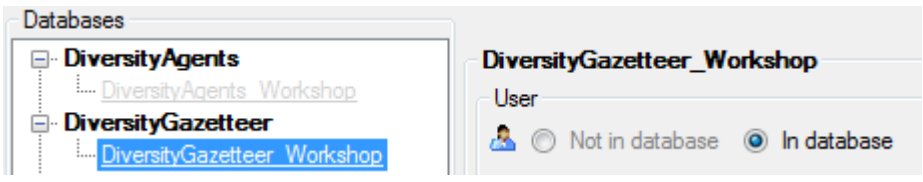


To edit the access for a login on the server, select the login in the list. If a login should be disabled , uncheck the enabled checkbox.

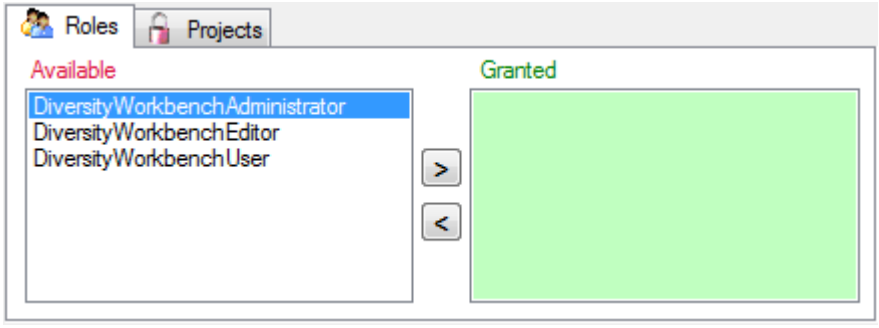
All databases on the server will be listed, with the current database showing a yellow background. The databases where the login has no access will be listed in gray while the databases accessible for a login are black.



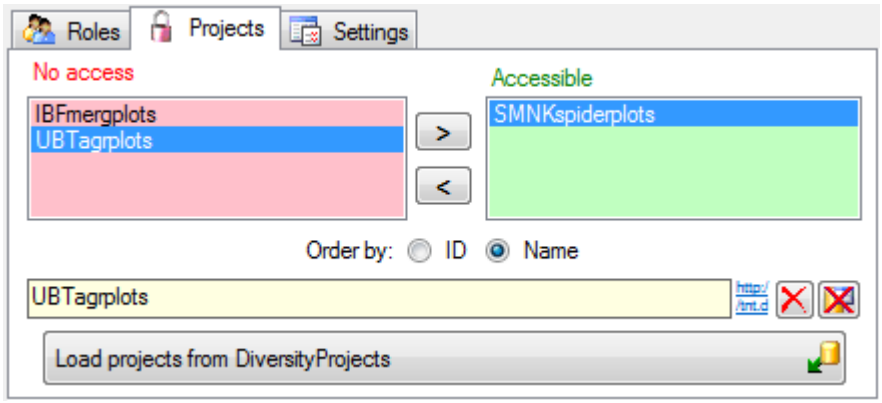
To give a user access to a database, select the database from the list and check the radio button **In database** as shown below.



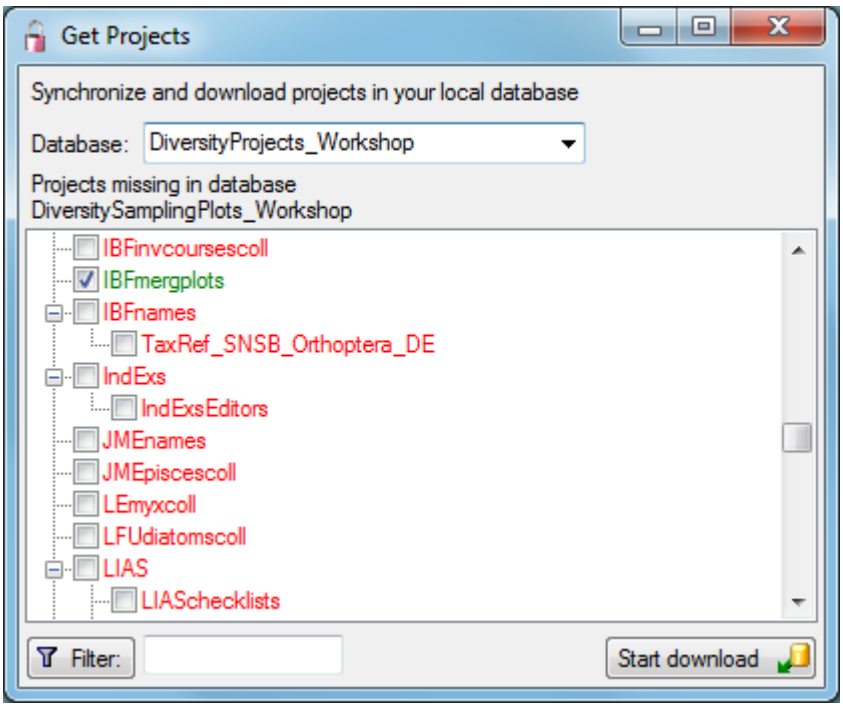
Use the **>** and **<** buttons to add or remove roles for the login in the database (see below).



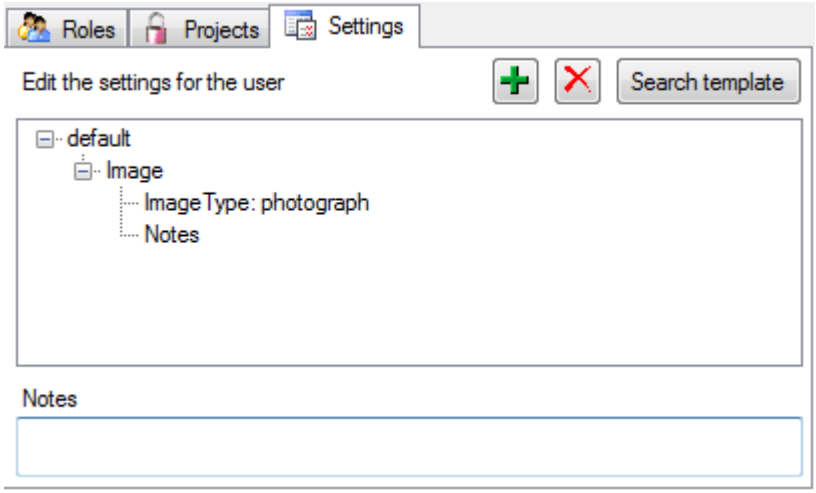
Depending on the database you can edit the list of projects accessible for a login (see below). Projects are related to the module DiversityProjects. To get additional informations about a project, select it in the list and click on the button.



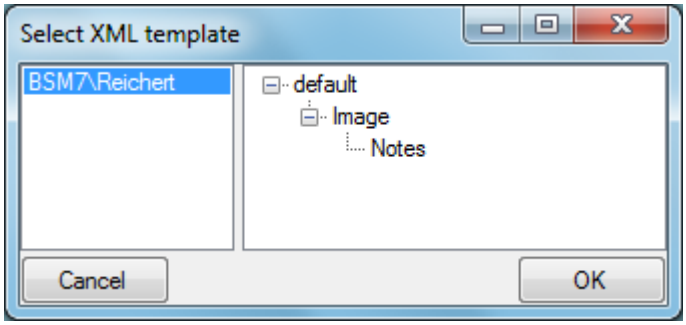
To load additional projects, click on the **Load projects** button. A window as shown below will open. Projects already in the database will be listed in green, missing projects in red (see below). Check all projects you need in your database and click the **Start download** button.



Depending on the database you can edit the settings of a login as shown below.

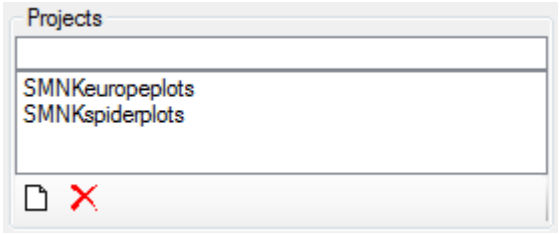


If you want to use settings already defined for another login, click on the Search template button. A window will open, where you can choose among the settings defined for logins in the database.

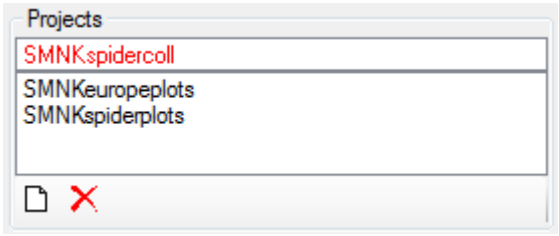


Projects

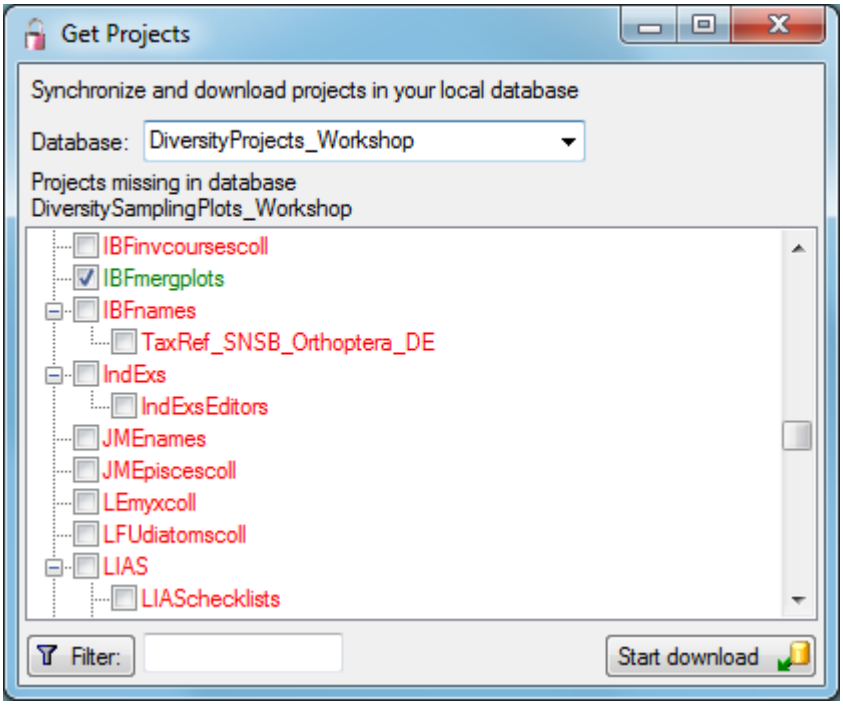
Every plot can be assigned to any number of projects. To assign a plot to a project click on the button. To remove it from a project, select the project from the list and click on the button.



If there are projects, to which you have no access to, these will be listed in a separate list at the top as shown below.



Details upon the projects within the Diversity Workbench are stored in the database DiversityProjects. To edit the projects you need the application **DiversityProjects.exe** and access to the database DiversityProjects. If DiversityProjects is not available you can create a new project with the **Administration - Projects ...** button.



User groups

A user can be in 4 groups with diverse rights in the database where certain higher groups have all rights of lower groups in addition to special rights for this group, e.g. the group DiversityWorkbenchUser can only read the data of certain tables while DiversityWorkbenchEditor has the rights of DiversityWorkbenchUser and additionally can edit the data in certain tables - see overview below.

Summarized overview of the permissions of the groups

Role	Permissions in addition to lower role resp. user group	Inculded rights
DiversityWorkbenchAdministrator	Delete data, edit user permissions	DataManager
DataManager	Delete data, edit image descripton templates	DiversityWorkbenchEditor
DiversityWorkbenchEditor	Create new entries and delete details (not whole datasets)	DiversityWorkbenchUser
DiversityWorkbenchUser	See the data of the data tables, add annotations	

If you are an DiversityWorkbenchAdministrator you can add a user to one of these Logins

Any user may have access to several Projects.

Tool bar

The tool bar beneath the menu offers a number of buttons:

Pressing the button will open the database connection form.

Pressing the button will save the currently displayed data set.

Pressing the button will undo the modifications of the current data set.

Pressing the button will let you create a new sampling plot entry for the database, using the GIS editor or the Localisation control.

Pressing the button will delete the currently selected sampling plot from the database.

Pressing the button will open the query options dialog to select the query conditions which should be displayed.

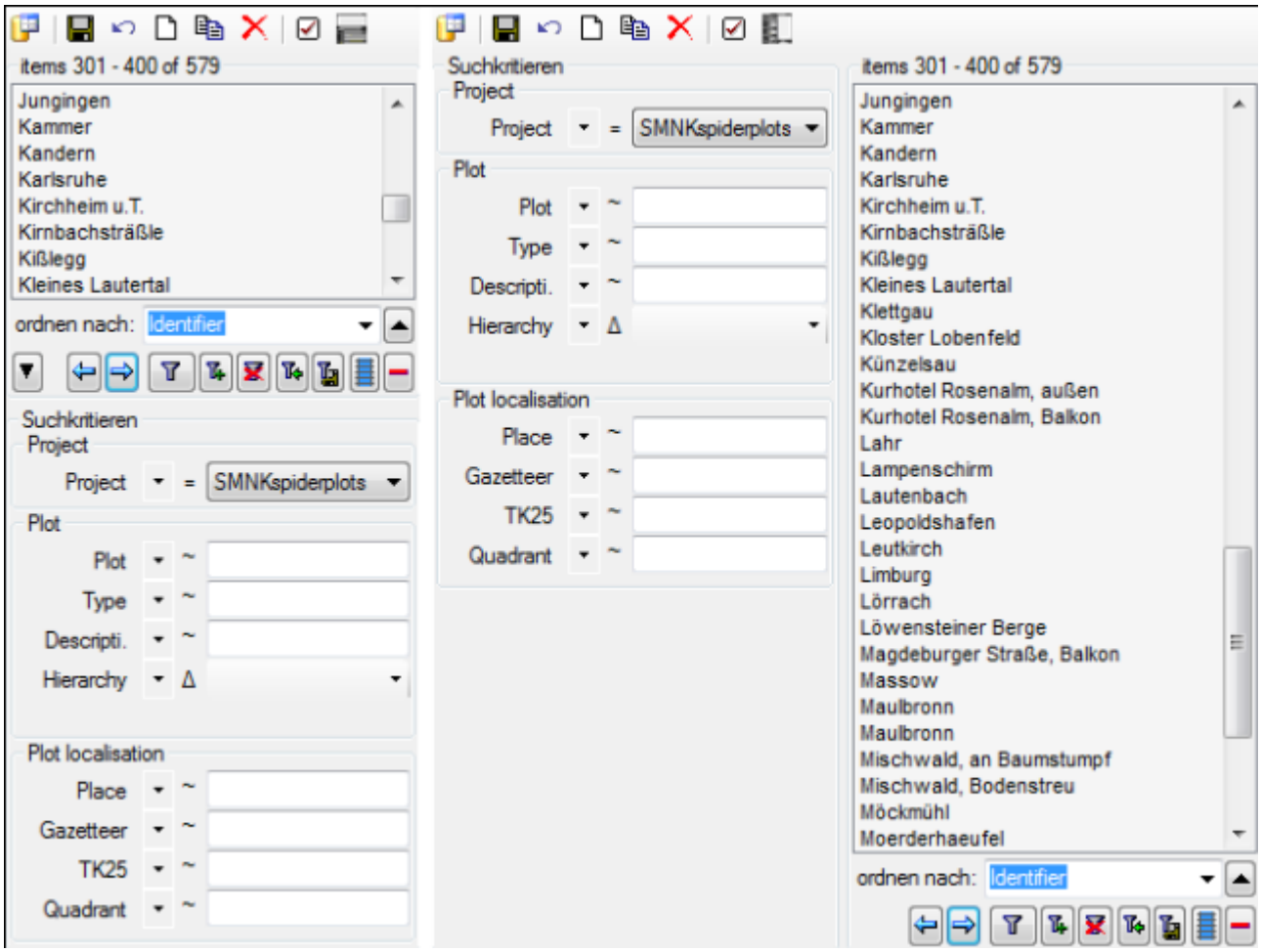
Pressing the button will allow you to switch the Query control orientation to vertical or horizontal.

Queries - overview

Plots can be searched in the database with the user defined queries by adjusting any query condition. You can save and load these queries.

Query

The options for a plot search are displayed in the main window beneath the list of the items. You can change this arrangement using the / button to place the query options on the left side of the item list.

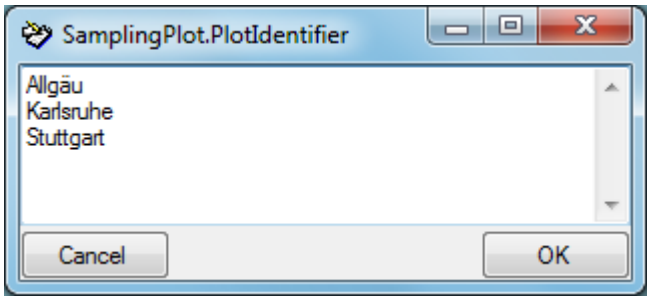


To search for plots enter the restrictions in the fields for the query conditions and click on the button. The plots found in the database will be shown in the results list. To add plots with differing search conditions click on the button. To clear all entries in the query fields use the button. You can save and load the queries you define using the and buttons. If the list of items is longer than your maximal number of returned items you can browse the next items with the button. To move back to the previous block of items click on the button. If you want to remove entries from the selected list, choose them and click on the button. This will not delete the data from the database, but remove them from your query result. To select all entries in the list click on the button. With the resp. buttons you can change the order of the results between ascending and descending. To blind out the query options and get more space for the item list press on the left side of the buttons. To show them again press the button.

Within the query options you have several possibilities to specify your search restriction. Use the drop down button to change between the operators. The available operators are shown in the table below.

Operator	Meaning	Example
Text		
~	search for an entry like ...	Pinus s[iy]lvestris % (you can use wildcards)
=	search for an entry exactly equal to ...	Pinus silvestris L.
≠	search for an entry not like ...	Pinus s[iy]lvestris % (you can use wildcards)
∅	search for an entry where a value is missing ...	
•	search for an entry where a value is present ...	
-	search for an entry between ... and ...	2000 - 2005
|	search within a list of entries, separated by "|"	2000 | 2003 | 2005
Numeric		
=	search for an entry exactly equal to ...	2006
<	search for an entry lower than ...	2006
>	search for an entry bigger than ...	2006
-	search for an entry between ... and ...	2000 - 2005
|	search within a list of entries, separated by "|"	2000 | 2003 | 2005
∅	search for an entry where a value is missing ...	
•	search for an entry where a value is present ...	
Date		
=	search for an entry exactly equal to ...	20.3.2006
<	search for an entry lower than ...	20.3.2006
>	search for an entry bigger than ...	20.3.2006
∅	search for an entry where the date is missing ...	
•	search for an entry where the date is present and complete ...	
Hierachy		
	search for all entries ...	
∅	search for entries without hierarchy ...	
•	search for entries with hierarchy ...	
Δ	search including childs in a hierarchy ...	GER-berlin

For a search within a list (using the "|" operator) you can double click in the textfield to open a window to enter your values. To separate the values either use the "|" sign or a new line as shown in the image below.



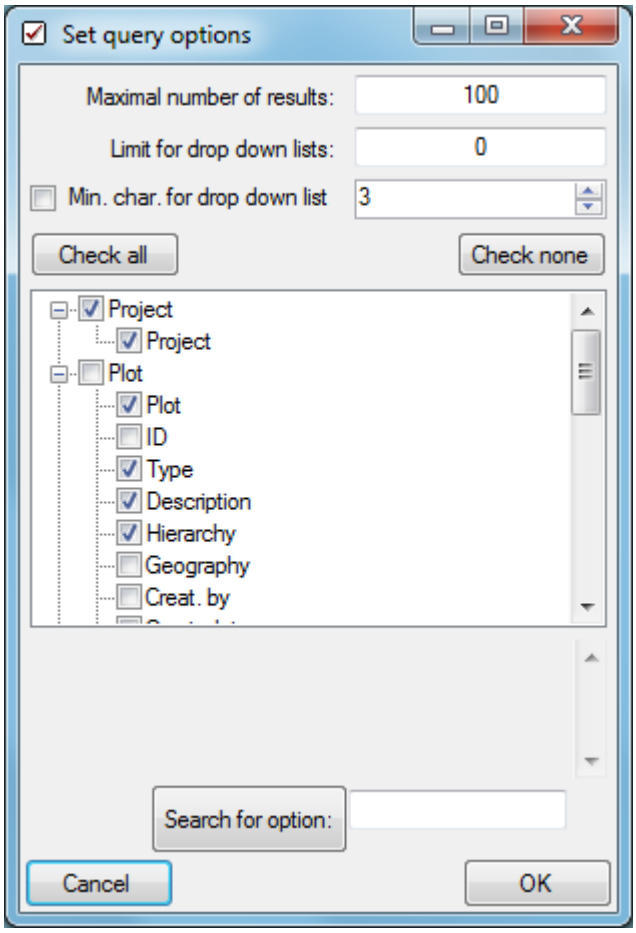
After all query conditions are set, click on the button to start the query. In the result list all plots will be displayed which matches your query and the selected maximal number of results.

Query options

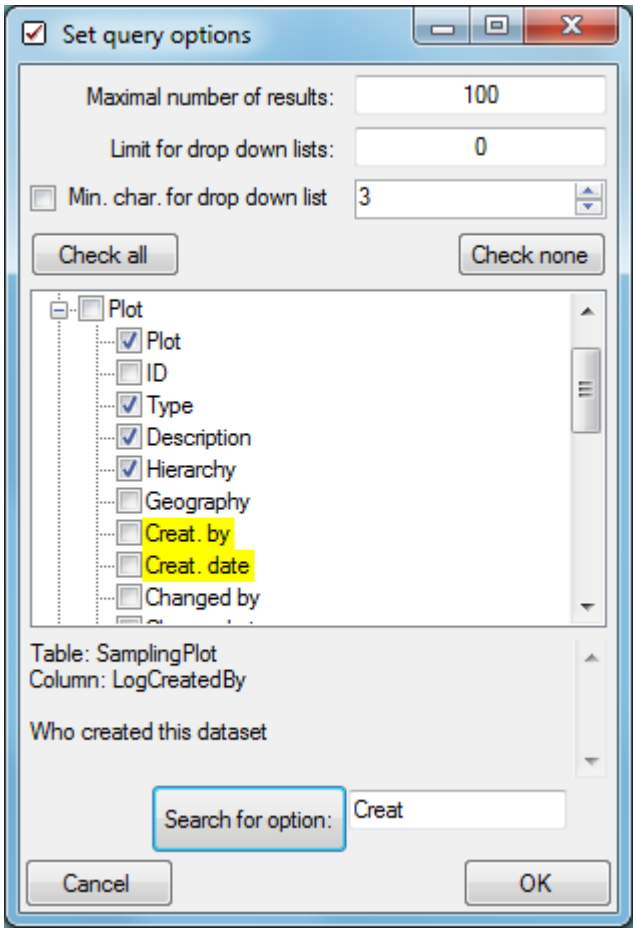
The maximal number of items shown in a query result can be set in the window for the query options. The default value is set to 100. If you have a fast connection to your database or need to see more or less results, you may change this value to any number you like.
To change the displayed search fields click on the ☑ button. This opens a form where you can select and deselect the fields shown for searching specimens. You might also change the maximum number of items that will be shown in the result list.

The limit for the creation of drop down lists is by default set to **0**, that means **no dropdown lists** will be created. If you set the limit to e.g. 1000 and connect to a database, the program will create a drop down list based on the entries in the database to ease the entry in the query. For slow connections you may set this to lower value to speed up the start of the program. If you set the value to 0 no drop down lists will be created.

You can set a minimum number of input characters before a drop down list will be build up. This is useful to limit the number of entries for large databases and fasten up your application.



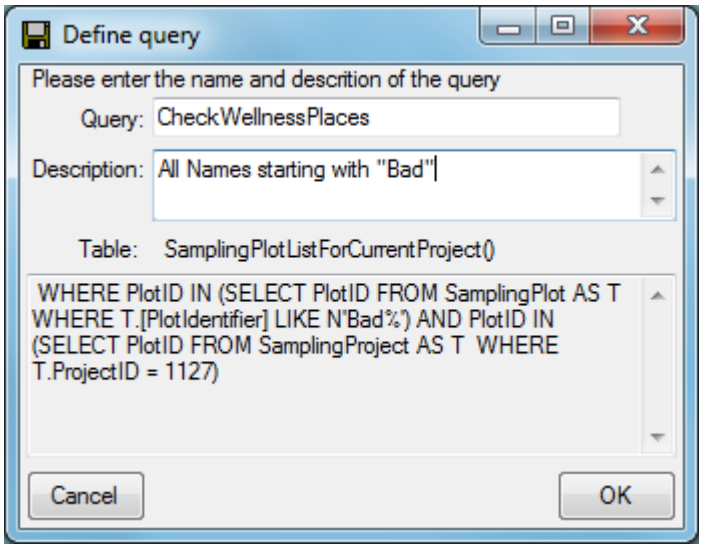
To search for a field within the database, use the search function that will check the names and descriptions of the fields and mark them as shown below.



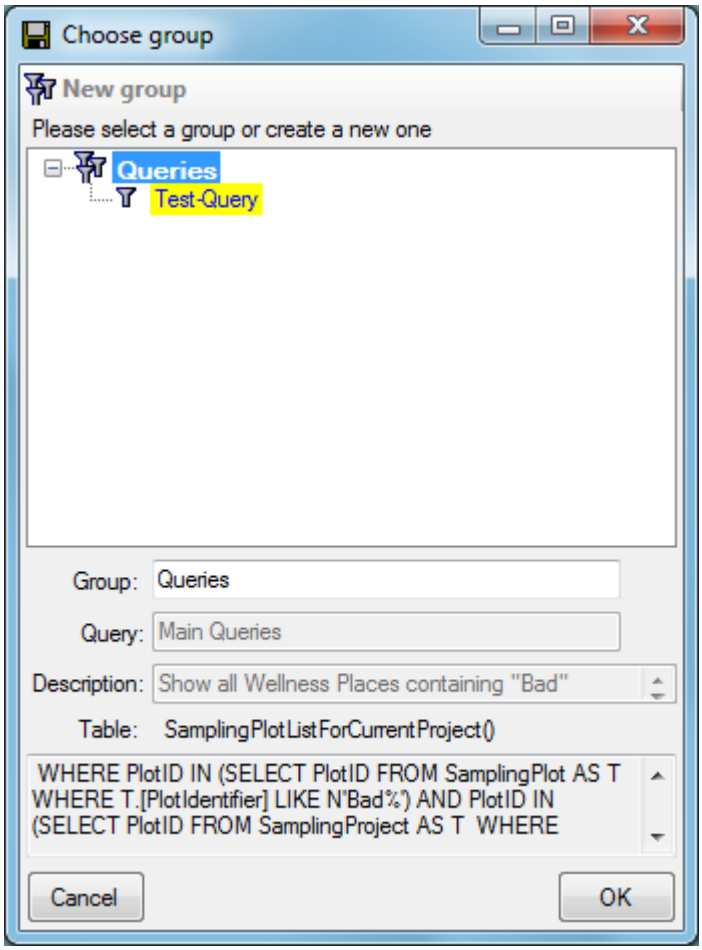
After having edited the query options click OK to store you selection. The new selection will become active for the next query.

Save query

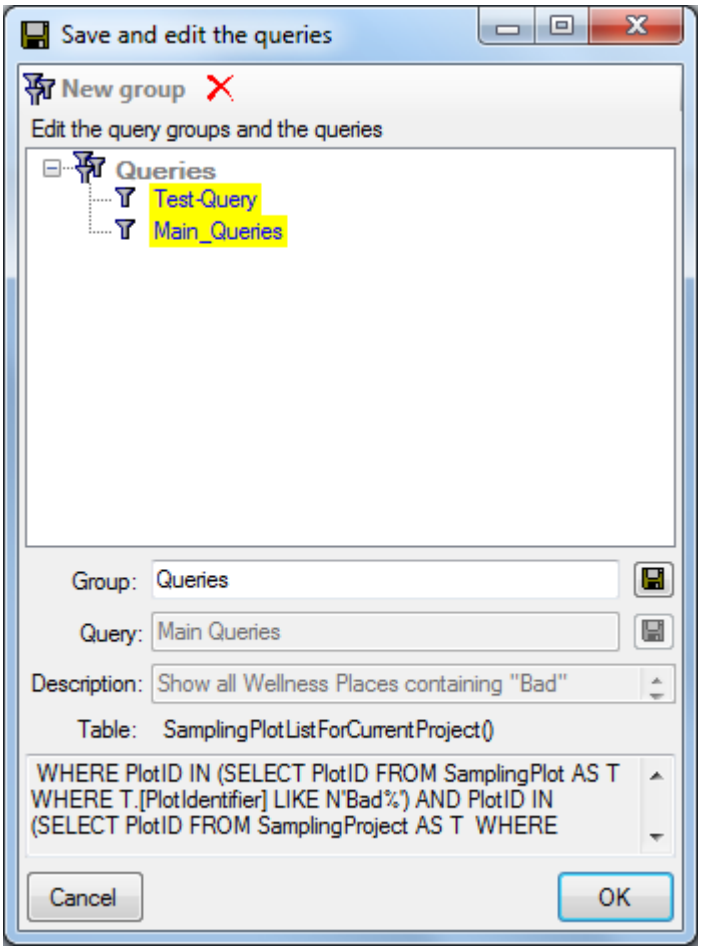
If you want to save a current query, click on the button. A window as shown below will open where you can specify the title and description of you query.



After you entered title and description of the query, click OK to specify the query group. A window as shown below will open.



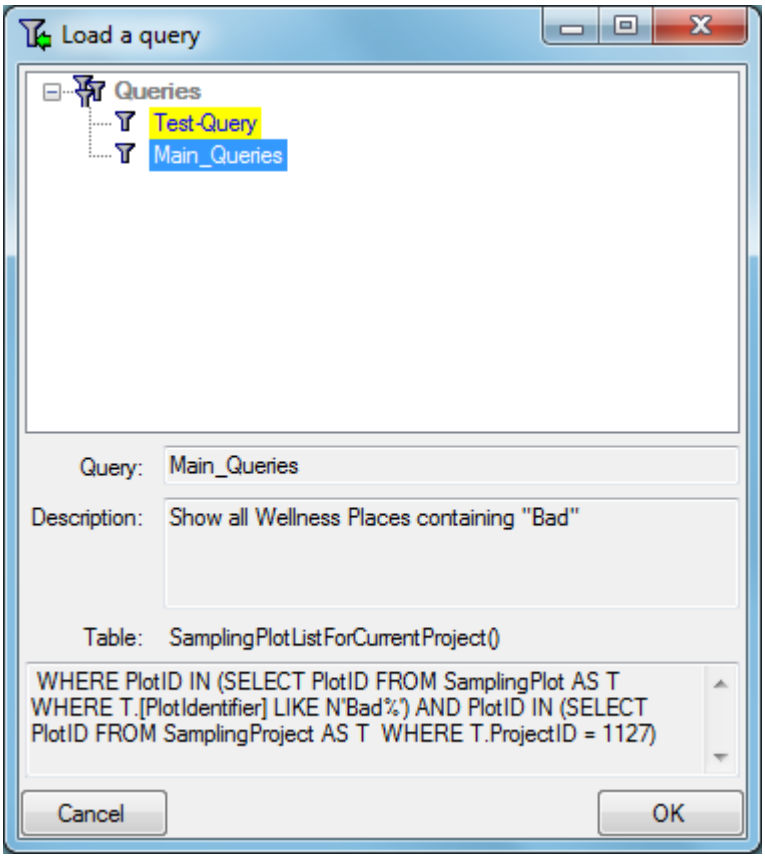
Choose a group from the tree or create a new one an click OK. The new query will be included in the selected group.



Finally you can edit the titles and descriptions of the groups and queries. Click the button to store the changes. To delete items from the tree, select it and click on the button. Click OK to save the new query and close the window.

Load query

If you want to load a query that has been stored previously, click on the button. A window as shown below will open.



Choose a query from the tree and click OK to close the form and filter the datasets according to the selected query.

Data Import and Replication

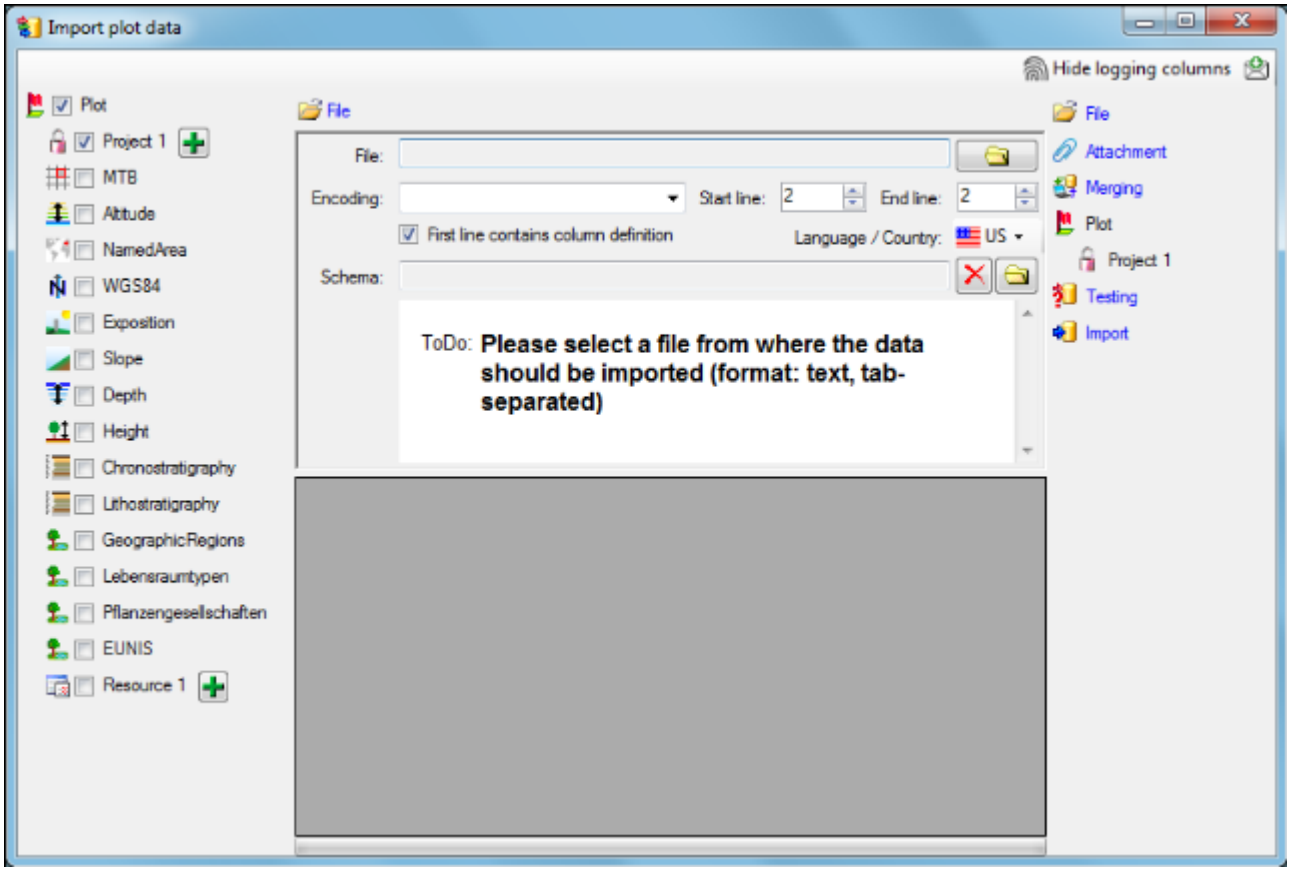
There are mechanisms for importing and replicating data:

Import wizard for tab separated lists: Import data from foreign sources and attach further data to data sets in the database.

Replication of a database: Create a copy of database items on your local computer or another database server.

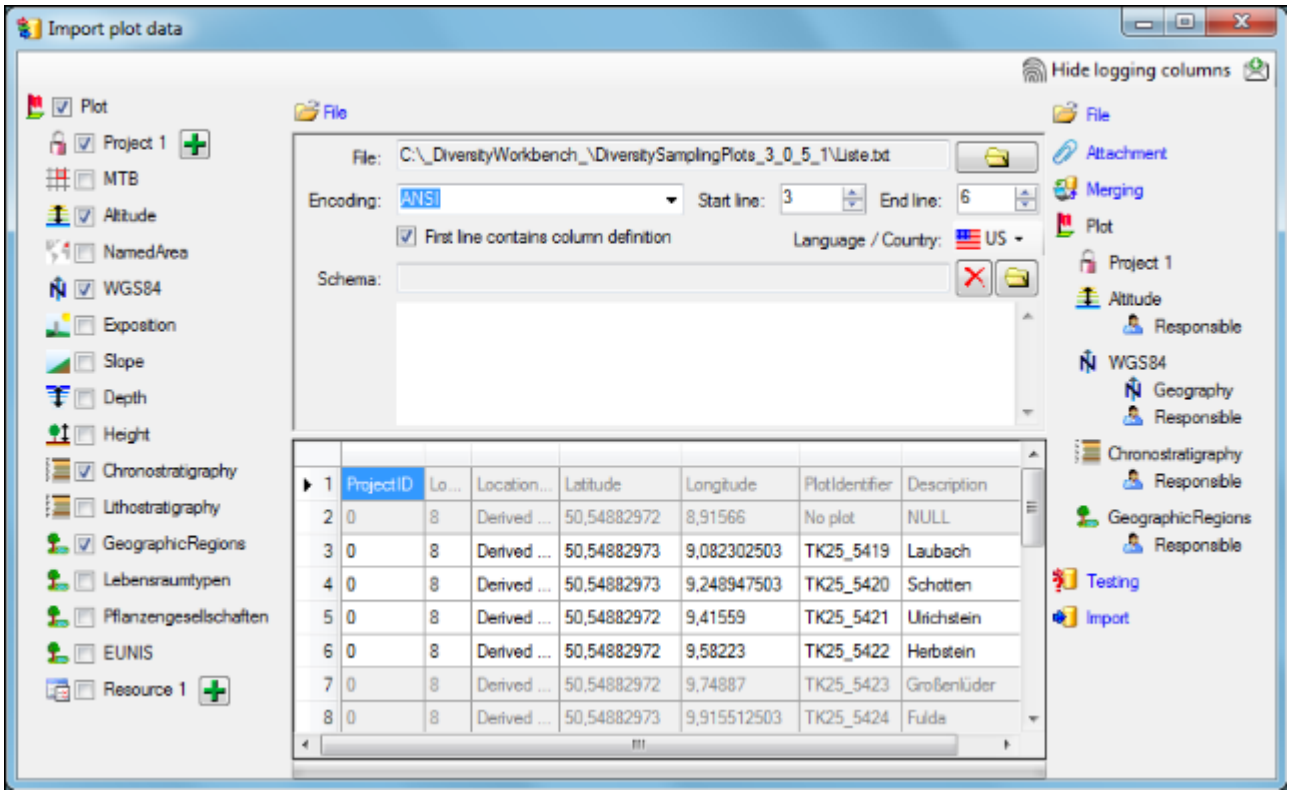
Import wizard for tab separated lists

With this import method you can import data from text files (as tab-separated lists) into the database. Choose **Data -> Import -> Wizard** and then the type of data that should be imported, e.g. **Sampling plot ...** from the menu. A window as shown below will open which will lead you through the import of the data. The window is separated in 3 areas. On the left side you see a list of possible data related import steps according to the type of data you choosed for the import. On the right side you see the list of currently selected import steps. In the middle part the details of the selected import steps are shown.



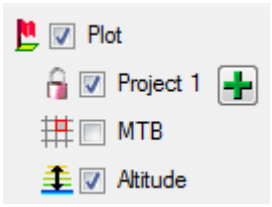
Selecting the File

As a first step, choose the File from where the data should be imported. The currently supported format is tab-separated text. Then select the **Encoding** of the file, e.g. Unicode. The **Start line** and **End line** will automatically be set according to your data. You may change these to restrict the data lines that should be imported. The not imported parts in the file are indicated as shown below with a gray background . If the **First line contains the column definition** is checked, this line will not be imported as well. If your data contains e.g. date information where notations differ between countries (e.g. 31.4.2013 - 4.31.2013), select an entry of the **Language / Country** drop-down list to ensure a correct interpretation of your data. Finally you can select a prepared **Schema** (see chapter Schema below) for the import.

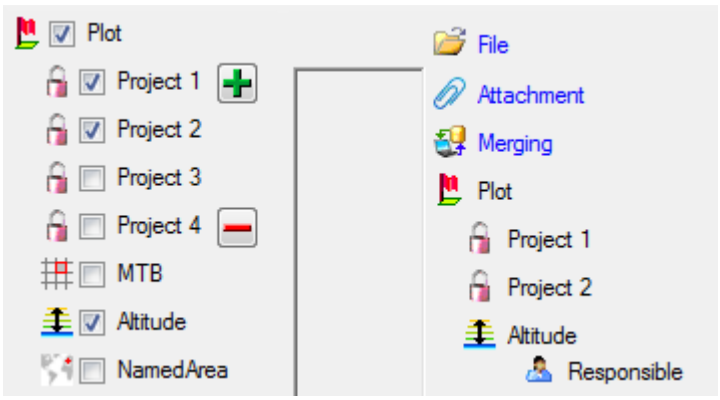


Choosing the data ranges

In the selection list on the left side of the window all possible import steps for the data are listed according to the type of data you want to import.

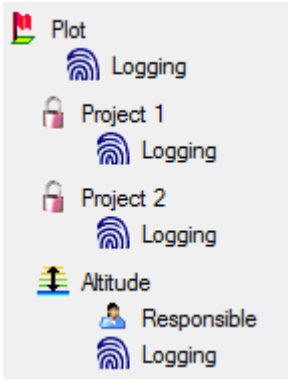


Certain tables can be imported in parallel. To add parallels click on the ✚button. To remove parallels, use the ▬button. Only selected ranges will appear in the list of the steps on the right.



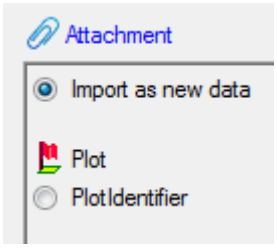
To import information of logging columns like who created and changed the data, click on the button in the header line. This will include additional substeps for every step containing the

logging columns. If you do not import these items, they will be automatically filled with default values like the current time and user.

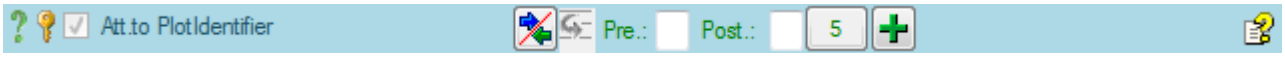


Attaching data

You can either import your items as new data or attach them to data in the database. Select the import step **Attachment** from the list. All tables that are selected and contain columns where data can be attached are listed. Either choose the first option **Import as new data** or one of the columns which are displayed below (e.g. **PlotIdentifier**).



If you select a column for attachment, this column will be marked with a blue background (see also chapter **Table data**).



Merging data

You may also merge your items with data which is already in the database. Select the import step **Merge** from the list. For every table you can choose between **Insert**, **Merge**, **Update** and **Attach**:

The **Insert** option will import the data from the file independent of existing data in the database.

The **Merge** option will compare the data from the file with those in the database according to the **Key columns**. If no matching data is found in the database, the data from the file will be imported, otherwise the data will be updated.

The **Update** option will compare the data from the file with those in the database according to the **Key columns**. Only matching data found in the database will be updated.

The **Attach** option will compare the data from the file with those in the database according

to the **Key columns**. The found data will not be changed, but used as a reference data in depending tables.

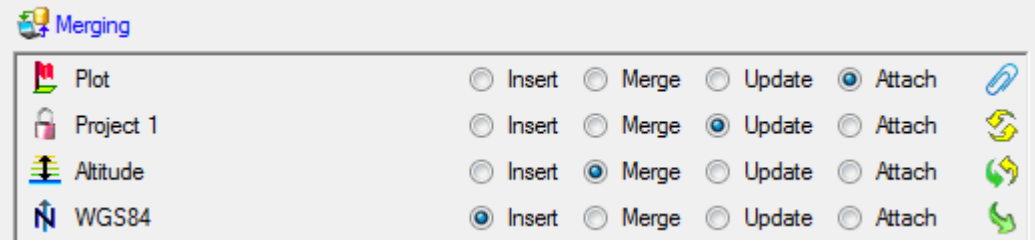
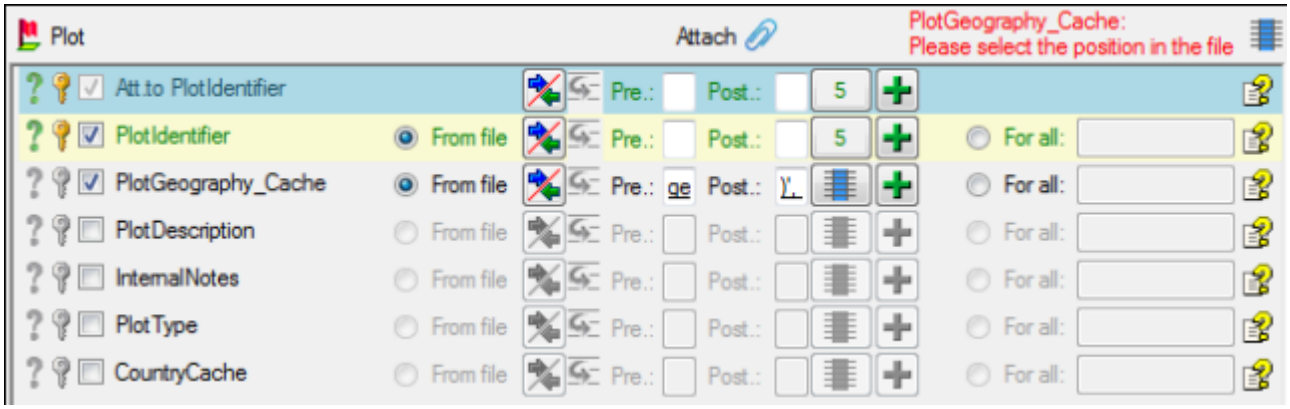


Table data

To set the source for the columns in the file, click at a step on the right side of the window. All columns available for importing data will be listed in the central part of the window. In the example shown below, the first column is used to attach the new items to data in the database.



A reminder in the header line will show you what actions are still needed to import the data into the table:

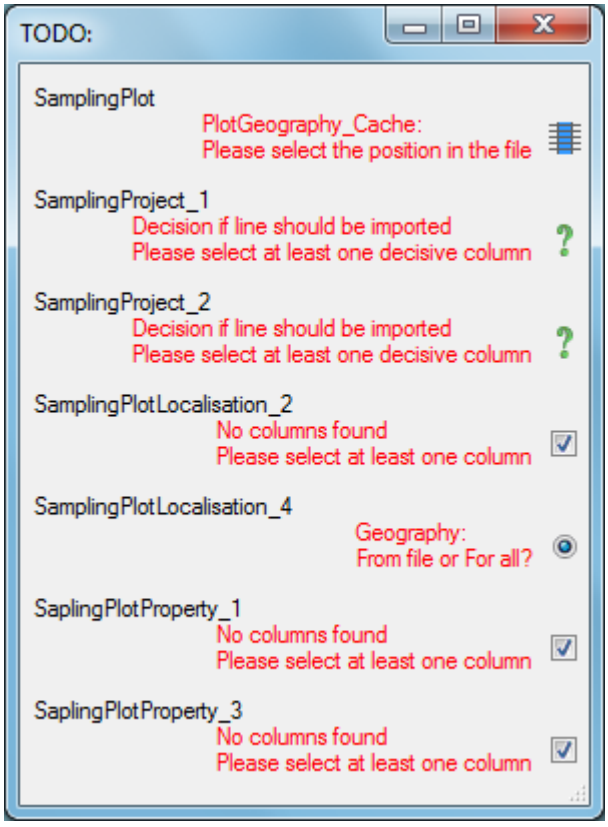
- Please select at least one column = No column has been selected so far.
- Please select at least one decisive column = Whether data will be imported or not, depends on the content of decisive columns, so at least one must be selected.
- Please select the position in the file = The position in the file must be selected if the data for a column should be taken from the file.
- Please select at least one column for comparision = For all merge types other than insert at least one column must be selected for comparision with data in the database.
- From file or For all = For each column you have to decide whether the data should be taken from the file or whether one value is specified for all.
- Please select a value from the list = You have to select a value from the provided list.
- Please enter a value = You have to enter a value used for all datasets.

The handling of the columns is described in the chapter columns.

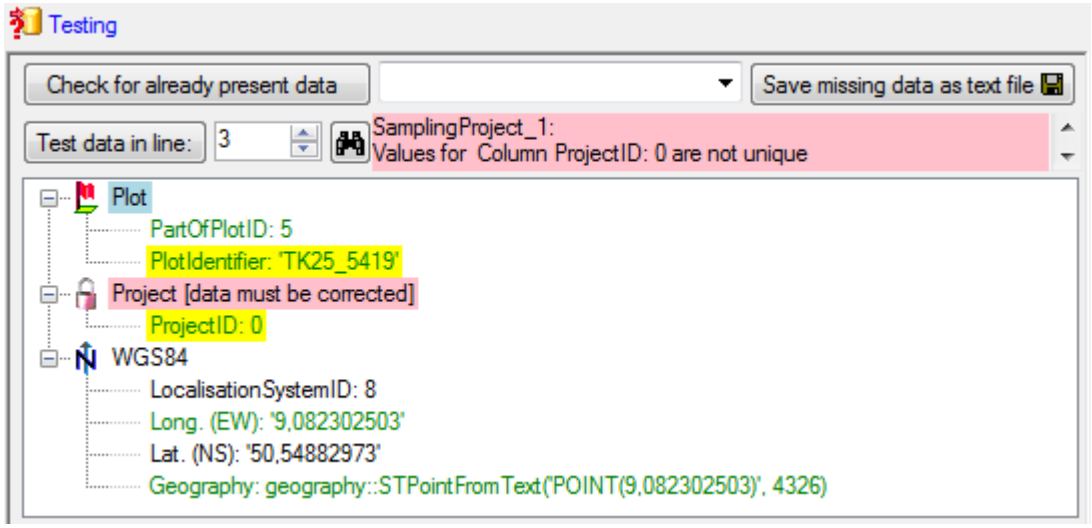
Testing

To test if all requirements for the import are met use the Testing step. You can use a

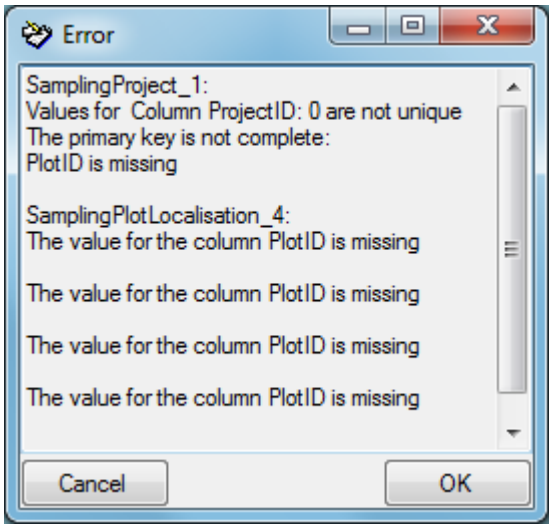
certain line in the file for your test and then click on the **Test data in line** button. If there are still unmet requirements, they are listed in a window as shown below.



If all requirements are met, the testing function will try to write the data into the database and display any errors that occurred as shown below. All datasets marked with a red background produced some error.



To see the list of all errors, double click in the error list window in the header line.



If finally no errors are left, your data is ready for import. The colors in the table nodes in the tree indicate the handling of the datasets: Insert, Merge, Update, No difference. Attach, No data. The colors of the table columns indicate whether a columns is decisive , a key column or an attachment column.

Import

With the last step you can start importing the data into the database. If you want to repeat the import with the same settings and data of the same structure, you can save a schema of the current settings (see below).

Schedule for import of tab-separated text files into DiversitySamplingPlots

Target within DiversitySamplingPlots: **SamplingPlot**

Schedule version: **1** | Database version: **01.00.15**
Lines: **3 - 12** | First line contains column definition: ✔
Encoding: **ANSI** | Language: **US**

Tables

SamplingPlot (SamplingPlot)
Merge handling: **Insert**

Column in table	?	Key	Copy	Pre	Post	File pos.	Transformations	Value	Source	Table
PlotID									Database	
PlotIdentifier	?					5			File	
PlotGeography_Cache				geography::STPointFromText ('POINT(		4	Replace With , .		File	
+					', 4326)	3	Replace With , .		File	
PlotDescription						6			File	
InternalNotes						2			File	

SamplingProject_1 (SamplingProject)
Parent: SamplingPlot
Merge handling: **Insert**

Column in table	?	Key	Copy	Pre	Post	File pos.	Transformations	Value	Source	Table
PlotID									Database	
ProjectID	?					0			File	

Lines that could not be imported will be marked with a red background while imported lines are marked green:

	Project 1 ProjectID		Plot InternalNotes	Plot PlotGeography_Cache	Plot PlotGeography_Cache	Plot PlotIdentifier	Plot PlotDescription
1	ProjectID	Localisa...	LocationNotes	Latitude	Longitude	PlotIdentifier	Description
13	0	8	Derived from Goo...	50,54882971	10,7487	TK25_5429	Themar
14	0	8	Derived from Goo...	50,54882975	10,91535	TK25_5430	Schleusingen
15	0	8	Derived from Goo...	50,54882971	11,082	TK25_5431	Untermeubrunn
16	0	8	Derived from Goo...	50°54882975	11,24865	TK25_5432	Großbreitenbach
17	0	8	Derived from Goo...	50,54882971	11,4153	TK25_5433	Gräfenthal
18	-23	8	Derived from Goo...	50,54882975	11,58195	TK25_5434	Leutenberg
19	0	8	Derived from Goo...	50,54882971	11,7486	TK25_5435	Liebengrün
20	0	8	Derived from Goo...	50,54882971	11,9152	TK25_5436	Schleiz
21	0	8	Derived from Goo...	50,54882975	12,08185	TK25_5437	Mühltroff

If you want to save lines that produce errors during the import in a separate file, use the Save failed lines option. The protocol of the import will contain all settings according to the used schema and an overview containing the number of inserted, updated, unchanged and failed lines:

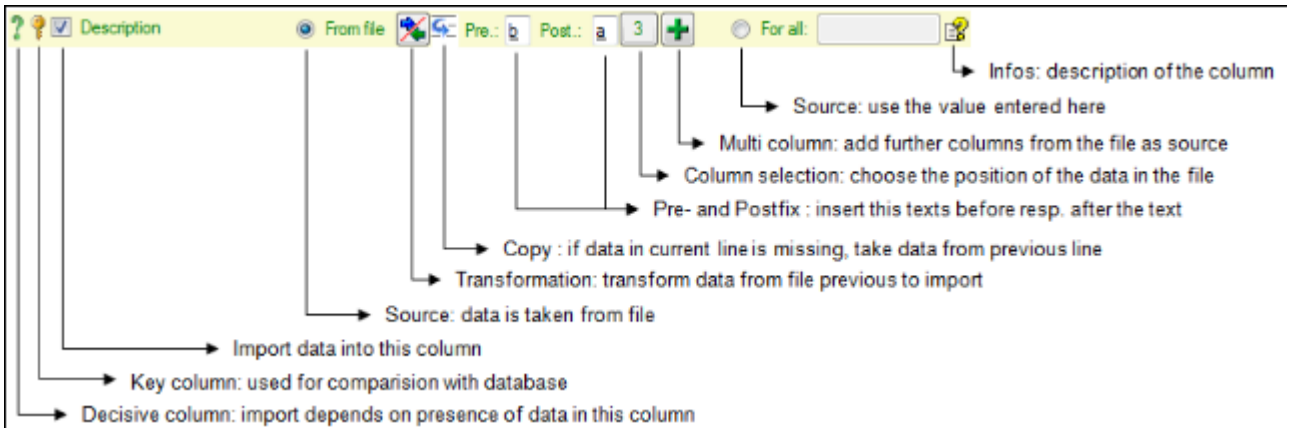
-

Protocol

Responsible: **Reichert**
Date: **Thursday, August 14, 2014, 11:59:06 AM**
Server: **snsb.diversityworkbench.de**
Database: **DiversitySamplingPlots**
Lines total: 9
Lines imported: 7
Lines failed: 3

Line	Table	Error
16		
	Plot (= SamplingPlot)	.NET Framework-Fehler beim Ausführen der benutzerdefinierten Routine oder des benutzerdefinierten Aggregats 'geography': System.FormatException: 24141: An Position 26 der Eingabe wird eine Zahl erwartet. Die Eingabe lautet aber 50°54882975. System.FormatException: bei Microsoft.SqlServer.Types.OpenGisWktReader.RecognizeDouble() bei Microsoft.SqlServer.Types.OpenGisWktReader.ParsePointText(Boolean parseParentheses) bei Microsoft.SqlServer.Types.OpenGisWktReader.ParseTaggedText(OpenGisType type) bei Microsoft.SqlServer.Types.OpenGisWktReader.Read(OpenGisType type, Int32 srid) bei Microsoft.SqlServer.Types.SqlGeography.GeographyFromText(OpenGisType type, SqlChars taggedText, Int32 srid) . Die Anweisung wurde beendet.
	Project (= SamplingProject_1)	The value for the column PlotID is missing
18		
	Project (= SamplingProject_1)	Die INSERT-Anweisung steht in Konflikt mit der FOREIGN KEY-Einschränkung 'FK_SamplingProject_ProjectProxy'. Der Konflikt trat in der 'DiversitySamplingPlots'-Datenbank, Tabelle 'dbo.ProjectProxy', column 'ProjectID' auf. Die Anweisung wurde beendet.

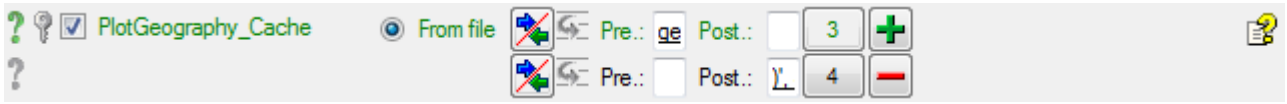
Import wizard - Columns



If the content of a file should be imported into a certain column of a table, mark it with the ☑ checkbox.

Decisive columns

The import depends upon the data found in the file where certain columns can be chosen as decisive, that means only those lines will be imported where data is found in any of these columns. To mark a column as **decisive**, click on the icon at the beginning of the line.



In the example shown below, the file columns Longitude, Latitude (resp. PlotGeography_Cache) were marked as decisive. Therefore only the two lines containing content in this columns will be imported.

ID	ParentID	Identifier	Longitude	Latitude	ProjectID1	ProjectID2
-766	-436	zwischen Grashalmen			1127	1135
-765	-436	Zimmerwand			1127	1135
-764	-436	Zimmerdecke	9.05207	48.5229	1127	1135
-763	-393	Zimmerdecke			1127	1135
-762	-405	Windbruch			1127	1135
-761	-469	Wiese, verrotteter Baumstamm	9.05207	48.5229	1127	1135
-760	-436	Waldrand, unter Brett am Boden			1127	1135
-759	-422	Waldrand, Nähe Teich und Holderfeld			1127	1135

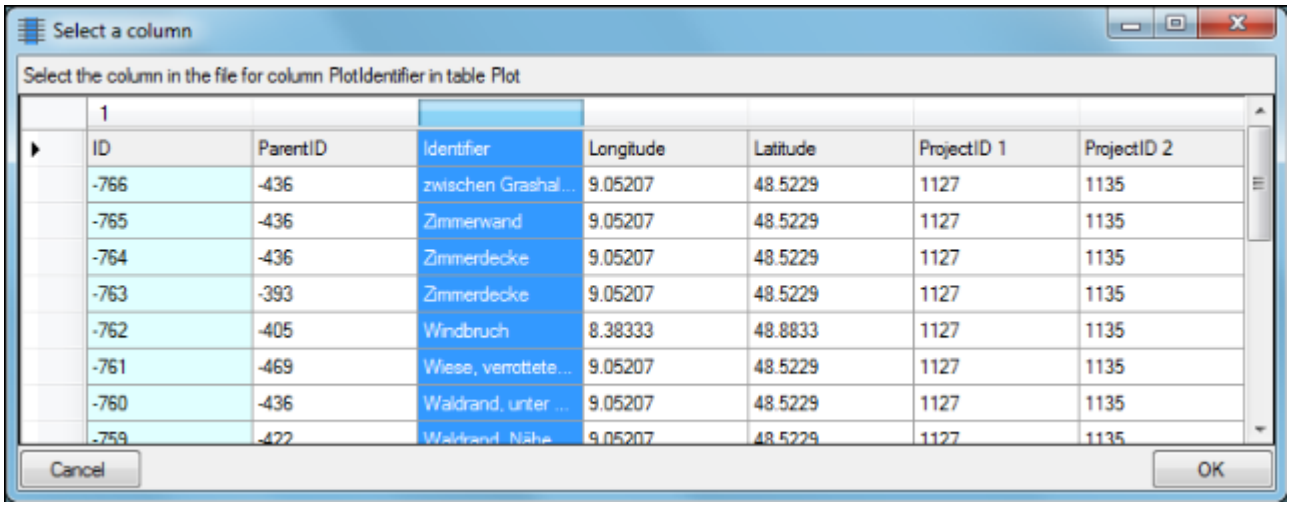
Key columns

For the options **Merge**, **Update** and **Attach** the import compares the data from the file with those already present in the database. This comparision is done via key columns. To make a column a key column, click on the icon at the beginning of the line. You can define as many key columns as you need to ensure a valid comparision of the data.

Source

The data imported into the database can either be taken **From file** or the value, that you

enter into the window or select from a list, can be used **For all** datasets. If you choose the **From file** option, a window as shown below will pop up. Just click in the column where the data for the column should be taken from and click **OK** (see below).



If you choose the **For all** option, you can either enter text, select a value from a list or use a checkbox for YES or NO.

Transformation

The imported data may be transformed e.g. to adapt them to a format demanded from the database. For further details please see the chapter Transformation.

Copy

If data in the source file is missing in subsequent lines, e.g.

ID	ParentID	Identifier	Longitude	Latitude
-766	-436	zwischen Grashalmen	9.05207	48.5229
-765		Zimmerwand		
-764		Zimmerdecke		
-763	-393			
-762	-405	Windbruch	8.38333	48.8833
-761	-469	Wiese, verrotteter Baumstamm		
-760	-436	Waldrand, unter Brett am Boden		
-759	-422	Waldrand, Nähe Teich und Holderfeld	9.05207	48.5229

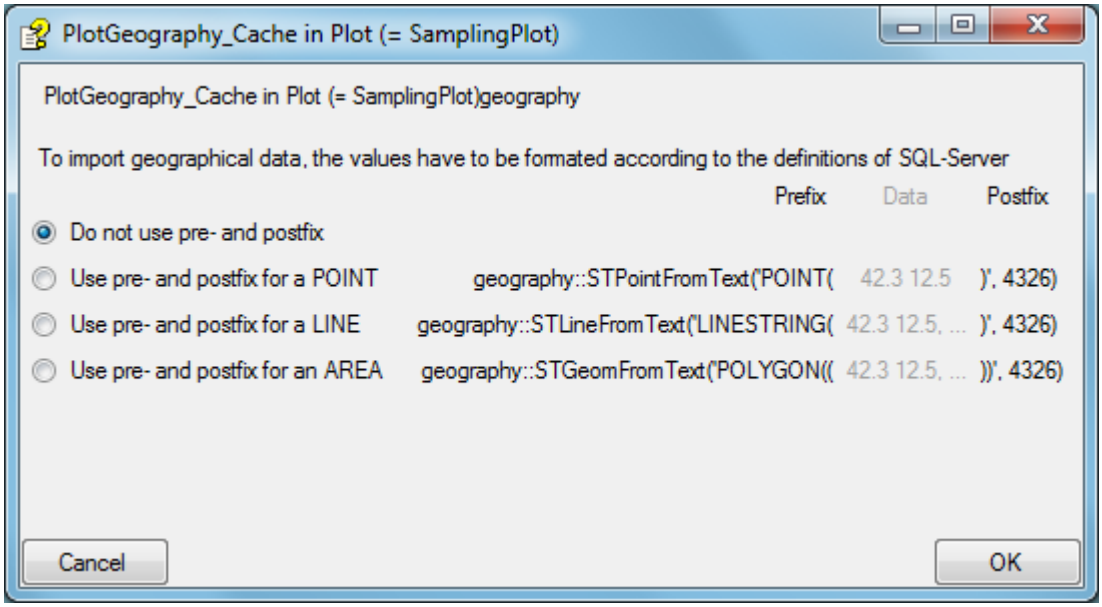
you can use the **Copy line** option to fill in missing data as shown below where the blue values are copied into empty fields during the import. Click on the button to ensure that missing values are filled in from previous lines.

ID	ParentID	Identifier	Longitude	Latitude
-766	-436	zwischen Grashalmen	9.05207	48.5229
-765	-436	Zimmerwand	9.05207	48.5229
-764	-436	Zimmerdecke	9.05207	48.5229
-763	-393	Zimmerdecke	9.05207	48.5229
-762	-405	Windbruch	8.38333	48.8833
-761	-469	Wiese, verrotteter Baumstamm	8.38333	48.8833
-760	-436	Waldrand, unter Brett am Boden	8.38333	48.8833
-759	-422	Waldrand, Nähe Teich und Holderfeld	9.05207	48.5229

Prefix and Postfix

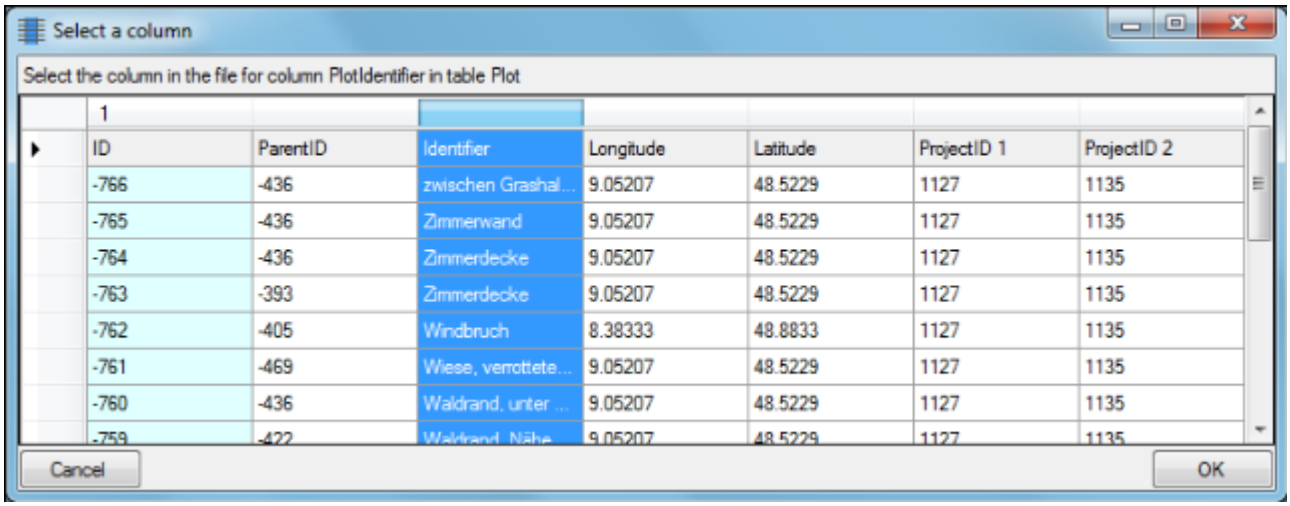
In addition to the transformation of the values from the file, you may add a pre- and a postfix. These will be added after the transformation of the text. Double-click in the field to see or edit the content. The pre- and a postfix values will only be used, if the file contains data for the current position.

For the datatype geography the pre- and postfixes will be automatically set to enable the import. The preset values by default are set for points as geographical units. You may change this to predefined types like lines or areas. Click on the button at the end of the line to open the information window. Here you can choose among the types mentioned above.



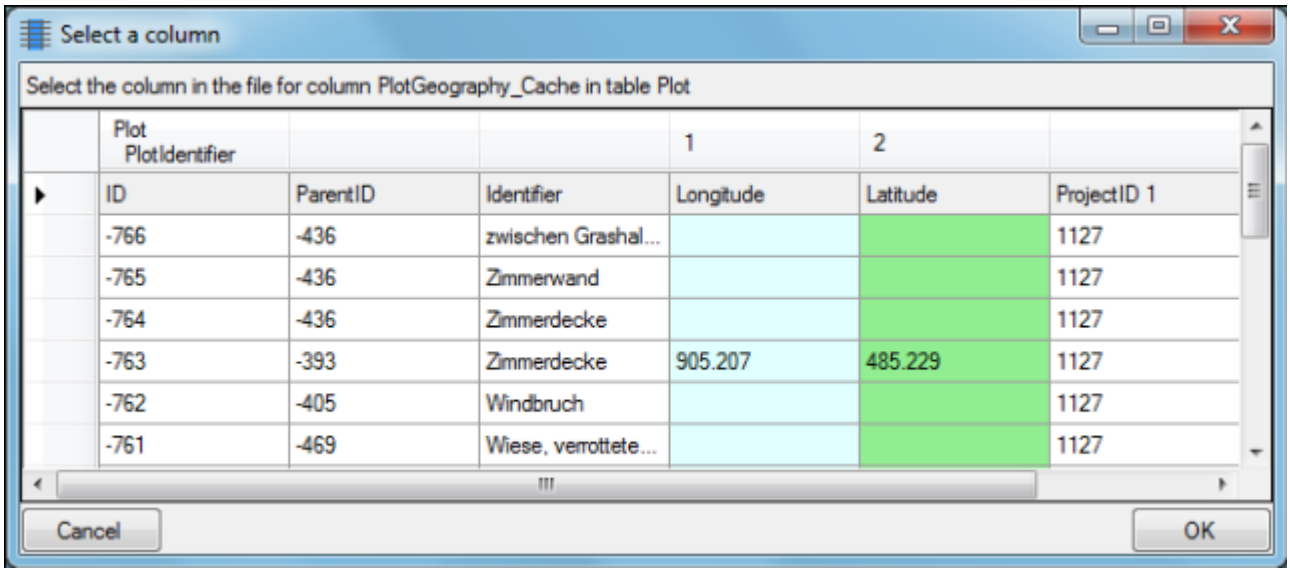
Column selection

If, for any reason, a column which should take its content from the imported file misses the position of the file or you want to change the position, click on the button. In case a position is present, this button will show the number of the column. A window as shown below will pop up where you can select or change the position in the file.

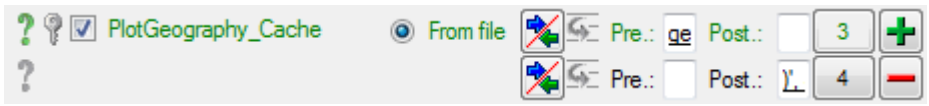


Multi column

The content of a column can be composed from the content of several columns in the file. To add additional file columns, click on the button. A window as shown below will pop up, showing you the column selected so far, where the sequence is indicated in the header line. The first column is marked with a blue background while the added columns are marked with a green background.



To remove an added column, use the button.

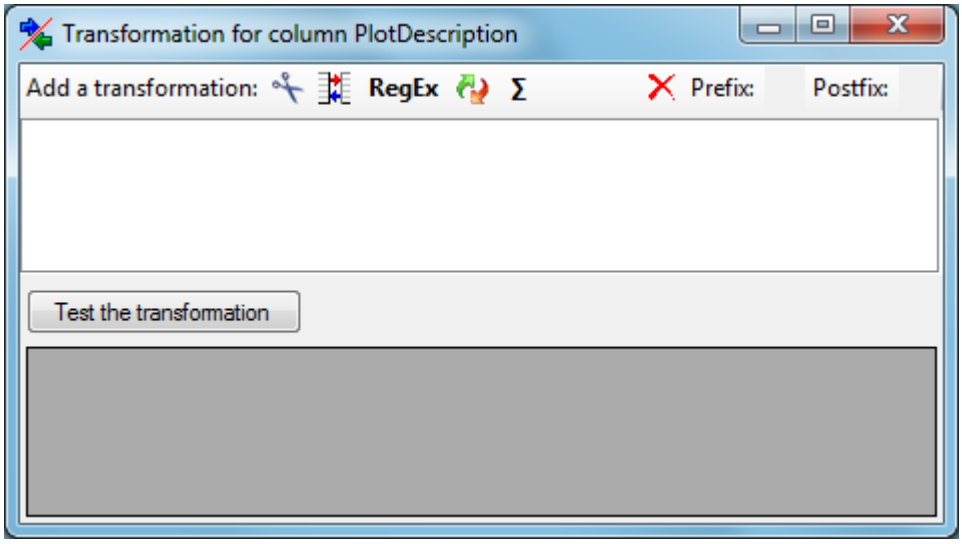


Information

The button opens a window displaying the information about the column. For certain datatypes additional options are included (see Pre- and Postfix).

Import wizard - transformation

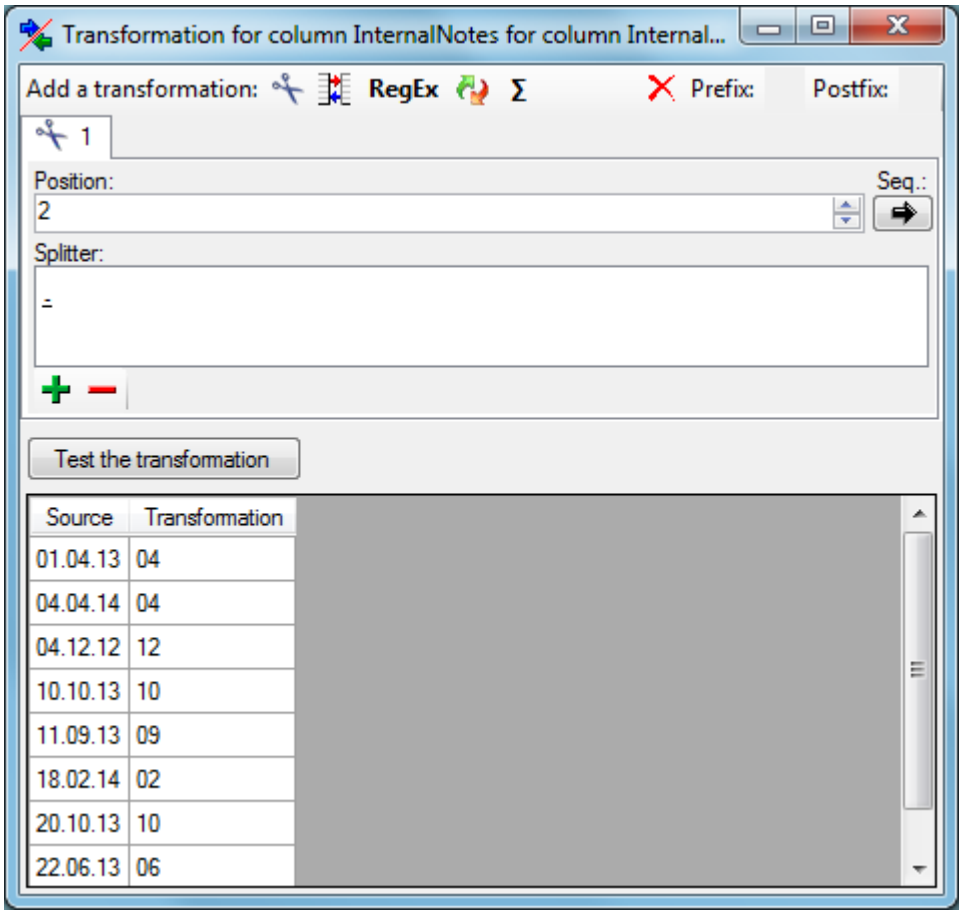
The data may be transformed during the import, e.g. to adapt it to a format demanded by the database. Click on the button to open the window below.



Here you can enter 4 types of transformations that should be applied to your data. cut out parts, translate contents from the file, **RegEx** apply regular expressions or replace text in the data from the file. All transformations will be applied in the sequence they had been entered. Finally, if a prefix and/or a postfix are defined, these will be added after the transformation. To remove a transformation, select it and click on the button.

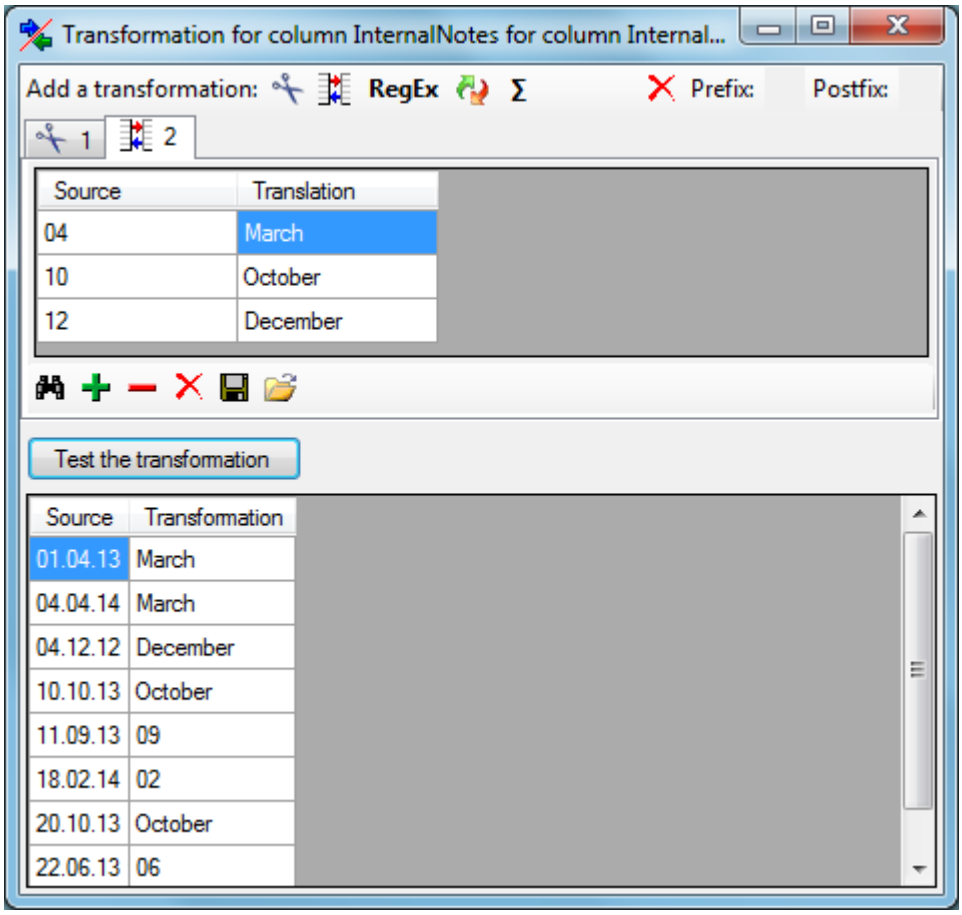
Cut

With the cut transformation you can restrict the data taken from the file to a part of the text in the file. This is done by splitters and the position after splitting. In the example below, the month of a date should be extracted from the information. To achieve this, the splitter '.' is added and then the position is set to 2. You can change the direction of the sequence with the Seq button starting at the first position and starting at the last position. Click on the button **Test the transformation** to see the result of your transformations.



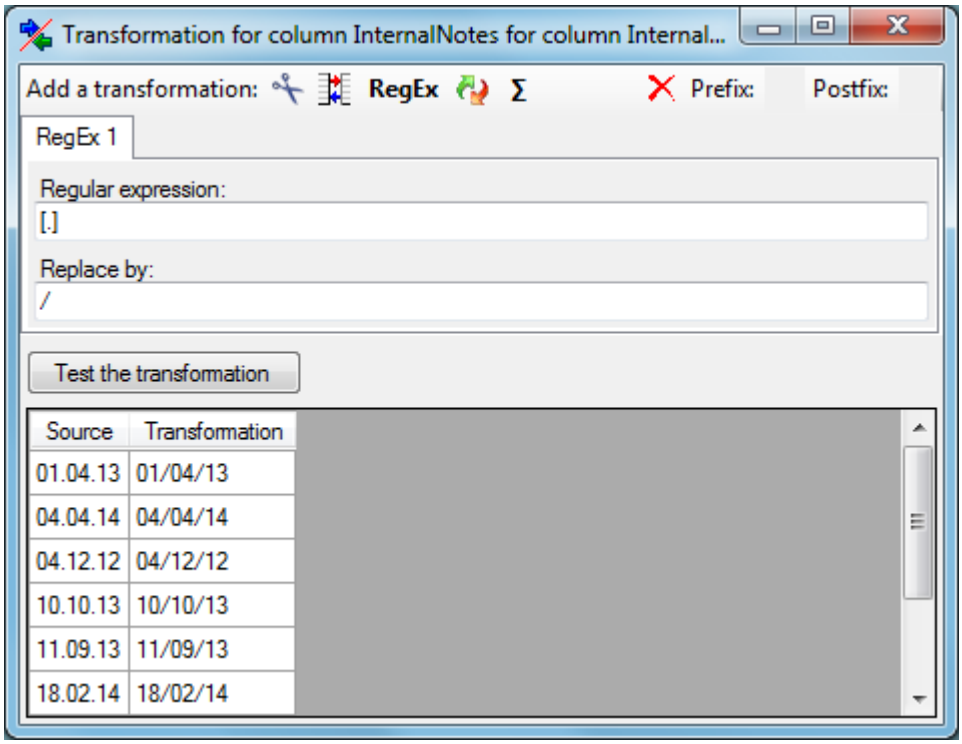
Translate

The translate transformation changes values from the file into values entered by the user. In the example above, the values of the month cut out from the date string should be translated from digits into names. To do this click on the button to add a translation transformation. To list all different values present in the data, click on the button. A list of entries will be created. You may as well use the and buttons to add values to or remove values from the list. Then enter the translations as shown below. Use the save button to save entries and the **Test the transformation** button to see the result. Press the button to clear the list.



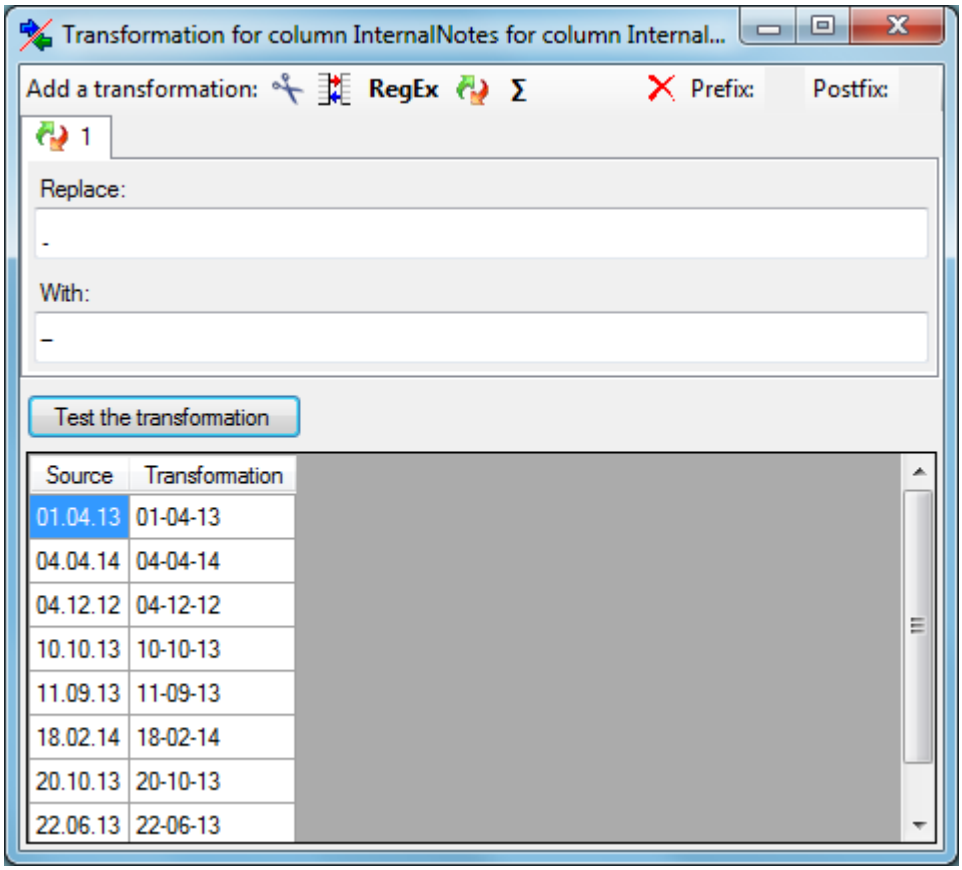
Regular expression

The **RegEx** transformation using regular expressions will transform the values according to the entered **Regular expression** and **Replace by** values. For more details please see documentations about regular expressions.



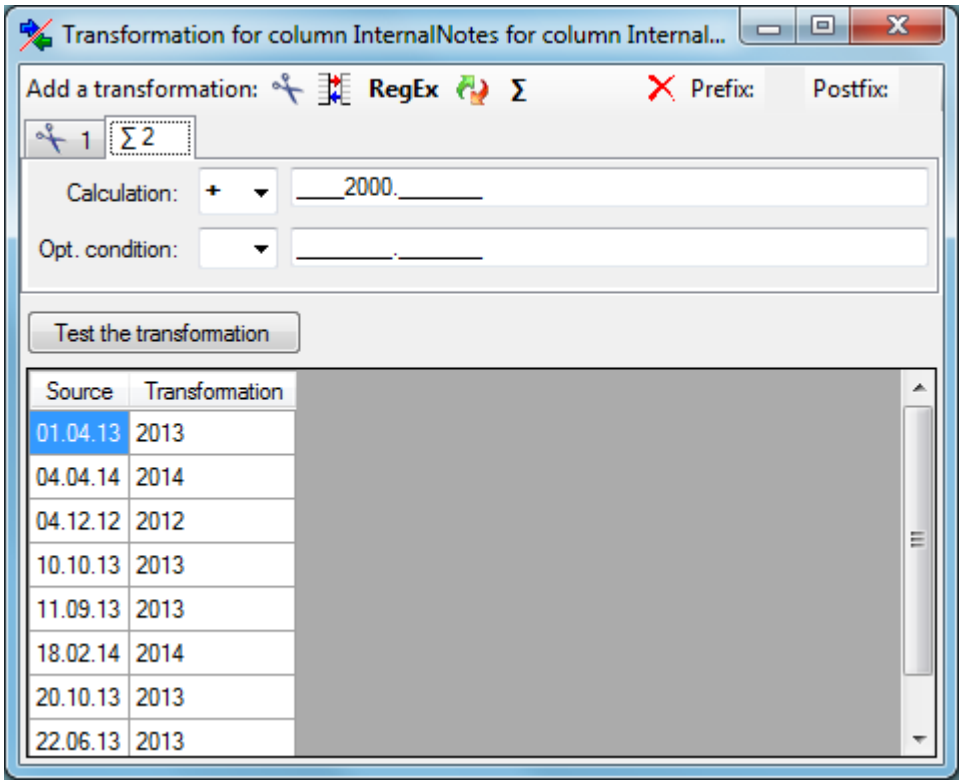
Replacement

The replacement transformation changes any text in the data defined under **Replace** by a text entered by the user under **With**, e.g. to adapt it to a format demanded by the database.



Calculation Σ

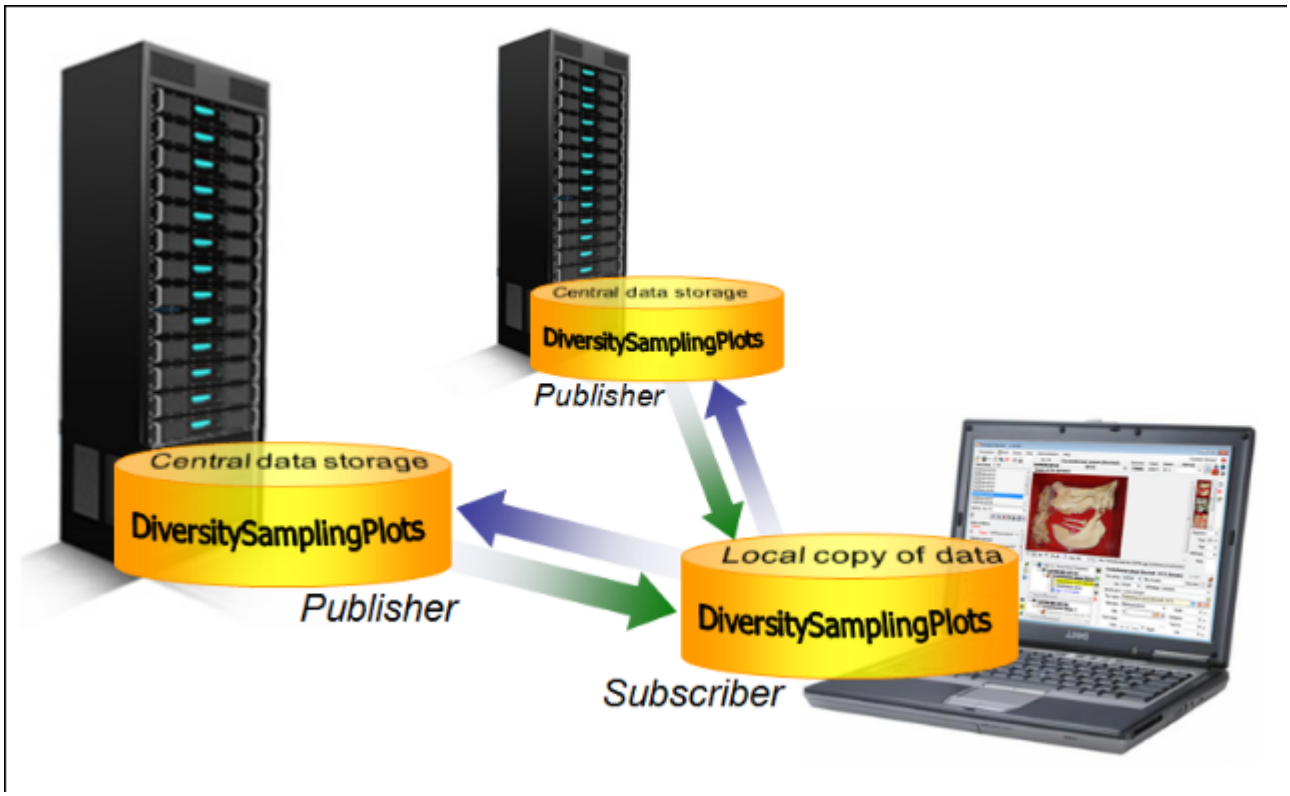
The calculation transformation performs a calculation on numeric value, dependent on an optional condition. In the example below a calculation is applied to convert 2-digit values into 4-digit years.



Replication

If you wish to work with your data on a local database (called *subscriber*), e.g. on your laptop, and this data should be synchronized with a database on a central server (called *publisher*), you may use the replication function of DiversitySamplingPlots. To install the database on your local computer see the database installation section.

To use the replication function you must be assigned to the roles **Replicator** or **Administrator**.



Add Publisher

To define a publishing database, choose **Data -> Replication -> Add Publisher** from the menu. A window will open where you can choose the *publisher*. When the *publisher* is set, you may transfer data between your local database (*subscriber*) and the *publisher*. This function is only available for administrators.

Remove Publisher

To remove a publisher from the list, choose **Data -> Replication -> [Publisher] -> Remove** from the menu (where [Publisher] is the name of the publishing database on the publishing server). This function is only available for administrators.

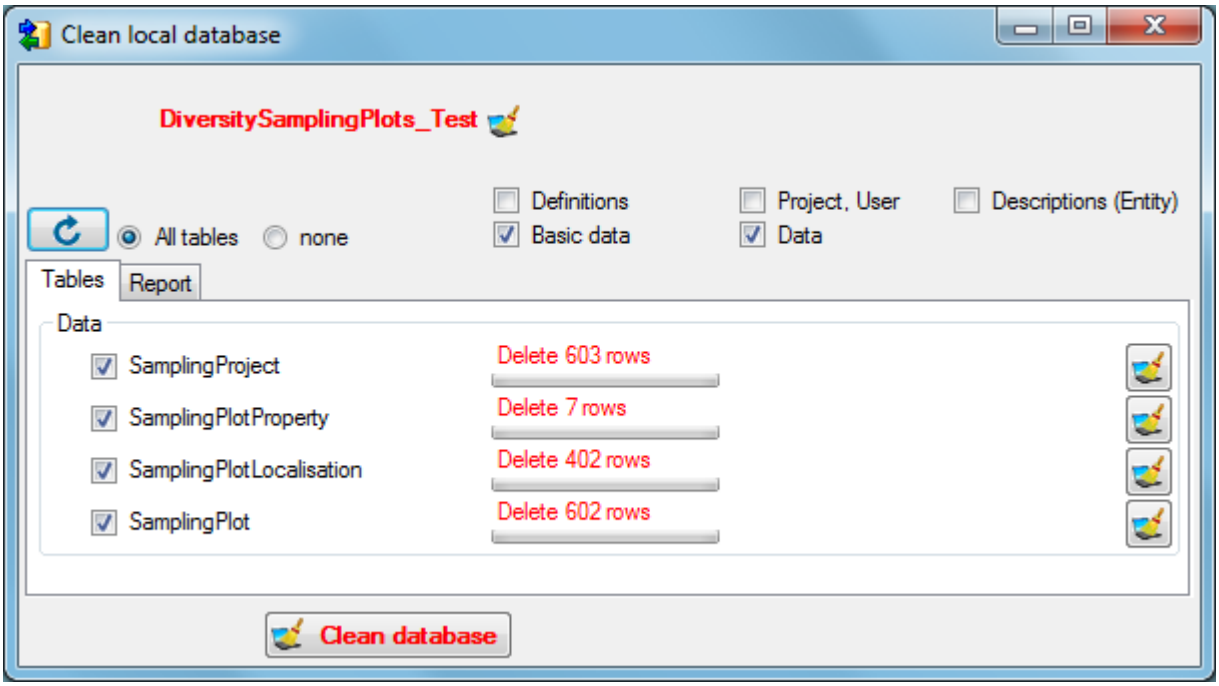
Clean database

Initially you may want to remove all previous data from your local database (*subscriber*). Choose **Data -> Replication -> Clean database ...** from the menu. A window will open where you may choose the ranges which should be cleared:

- Definitions = the basic definitions within the database, e.g. localisation system,

properties.
- Descriptions = the descriptions and their translations of the tables and columns of the database.
- Project, User = the available projects and users.
- Basic data = basic data, if available.
- Data = e.g. sampling plots.

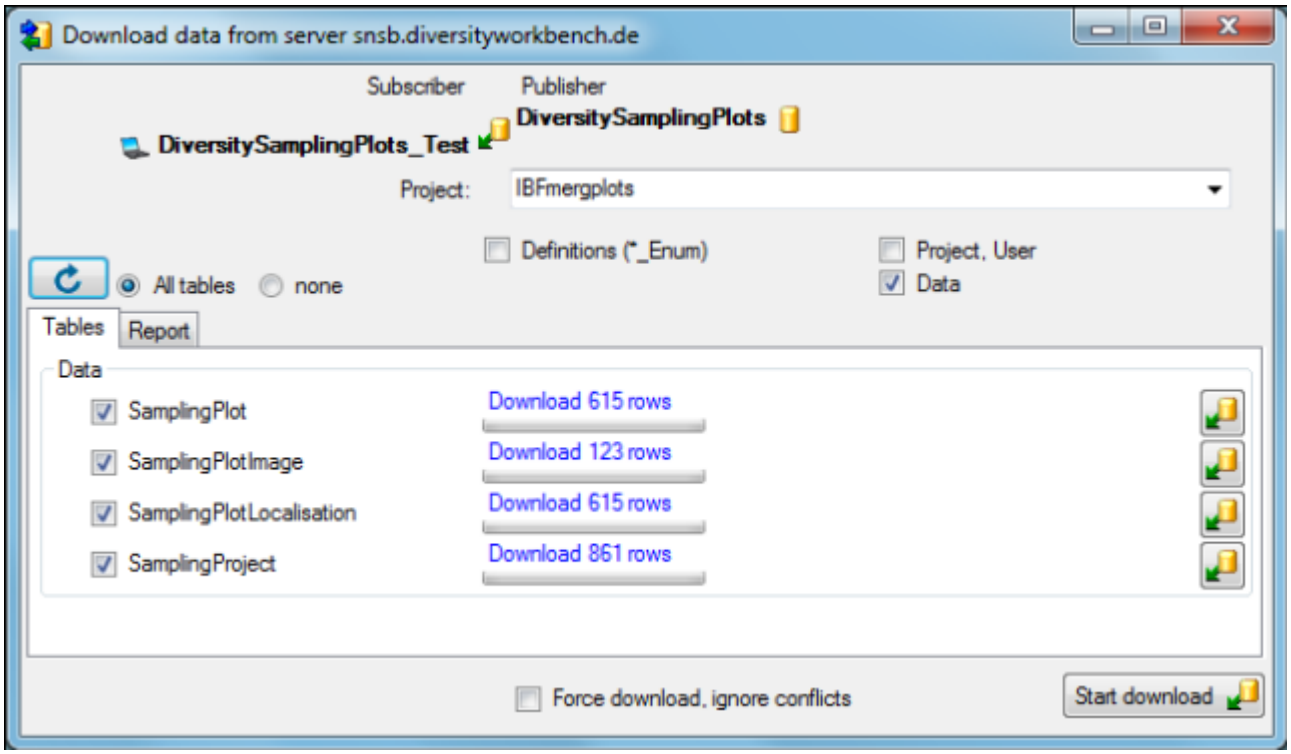
Choose the data ranges you wish to clear and click on the button. All tables which contain data will be listed as shown below.



Choose the tables which should be cleared and click on the **Clean database** button. Please keep in mind that you can not delete data from a table as long as there is data in a related table depending on the data you wish to delete. The sequence of the tables is organized to avoid these problems.

Download

To download data from the *publisher* choose **Data -> Replication -> [Publisher] -> Download** from the menu (where [Publisher] is the name of the publishing database on the publishing server). A form will open as shown below. Choose the project of the data and the data ranges (see above) which you wish to download. Click on the button to list the tables containing data. To start the download click on the **Start download** button. With the **Force download, ignore conflicts** option you can decide whether or not the data in your local database (*subscriber*) should be checked for changes before you download the data from the publisher.



If the selected project does not exist in the *Subscriber* database, you will be prompted to create it automatically.

Merge

To merge data from your local *subscriber* database with the *publisher*, you must first select a project in the Query section of the SamplingPlots main window. Then choose **Data ->** **Replication ->** **[Publisher] ->** **Merge** from the menu (where [Publisher] is the name of the publishing database on the publishing server). According to the download, choose the data ranges and click on the button. To start the merging, click on the **Start merge** button.

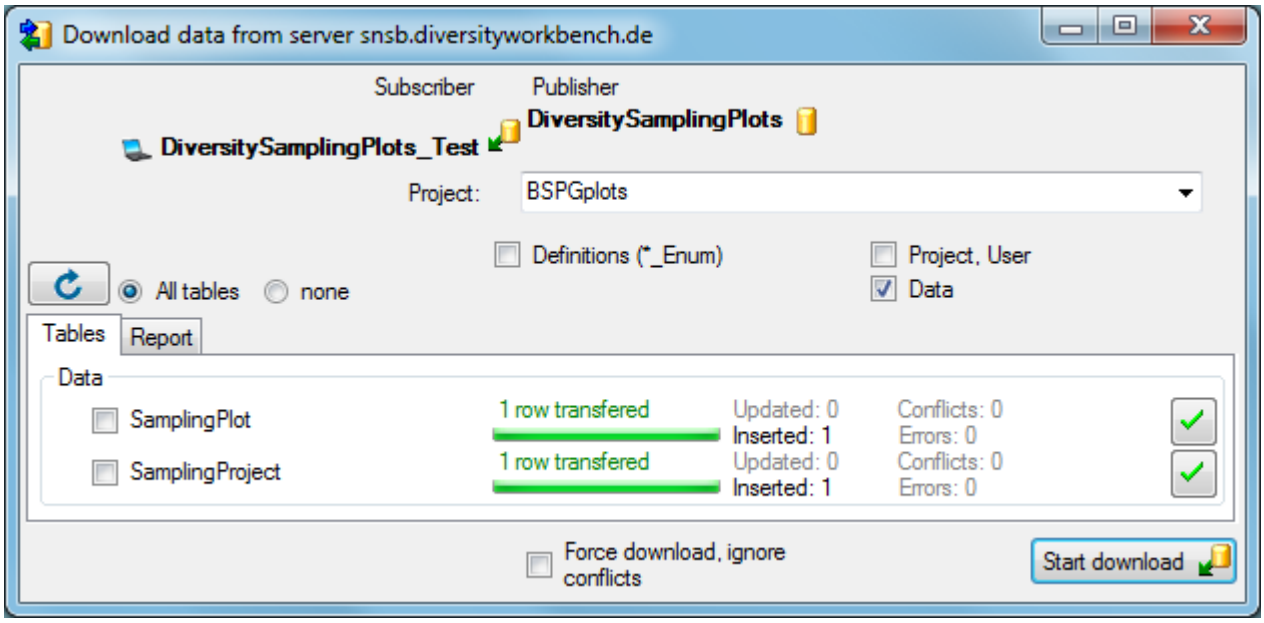
Upload

To transfer data from your local *subscriber* database to the *publisher*, you must first select a project in the Query section of the SamplingPlots main window. Then choose **Data ->** **Replication ->** **[Publisher] ->** **Upload** from the menu (where [Publisher] is the name of the publishing database on the publishing server). According to the download, choose the data ranges and click on the button. To start the upload, click on the **Start upload**

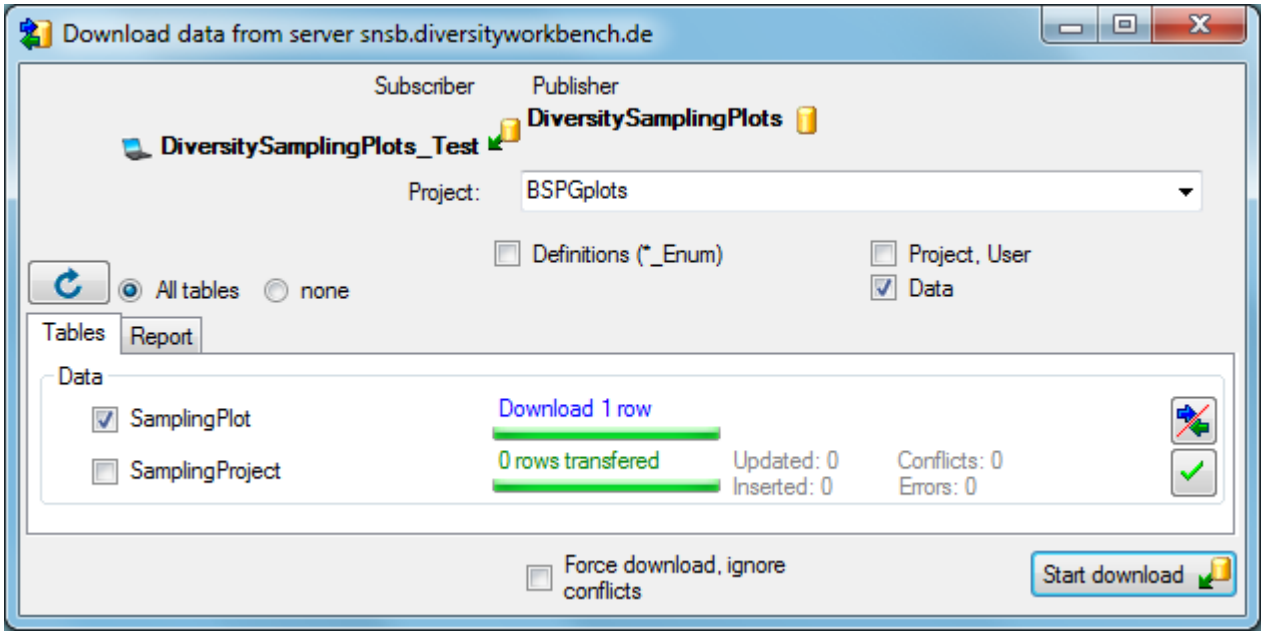
button. With the **Force upload, ignore conflicts** option you can decide whether or not the data on the server (*Publisher*) should be checked for changes before you upload the data from your local database (*Subscriber*).

Conflict

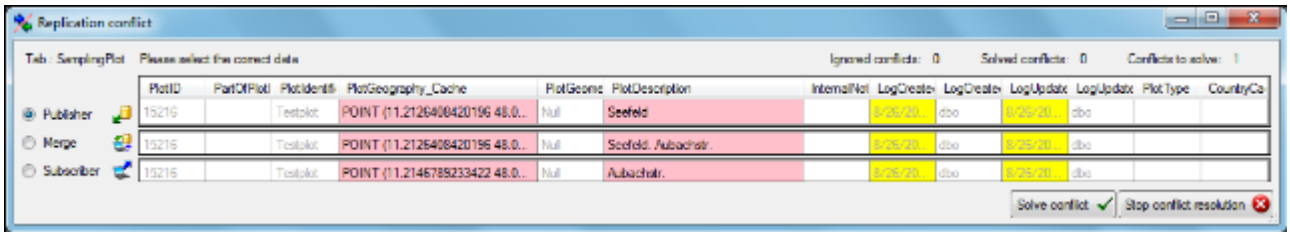
If the data transfer was successfull, the numbers of the transfered data will be shown as below.



During the download or upload a conflict may occur, if the data has been edited in both databases. This will be indicated as follows.



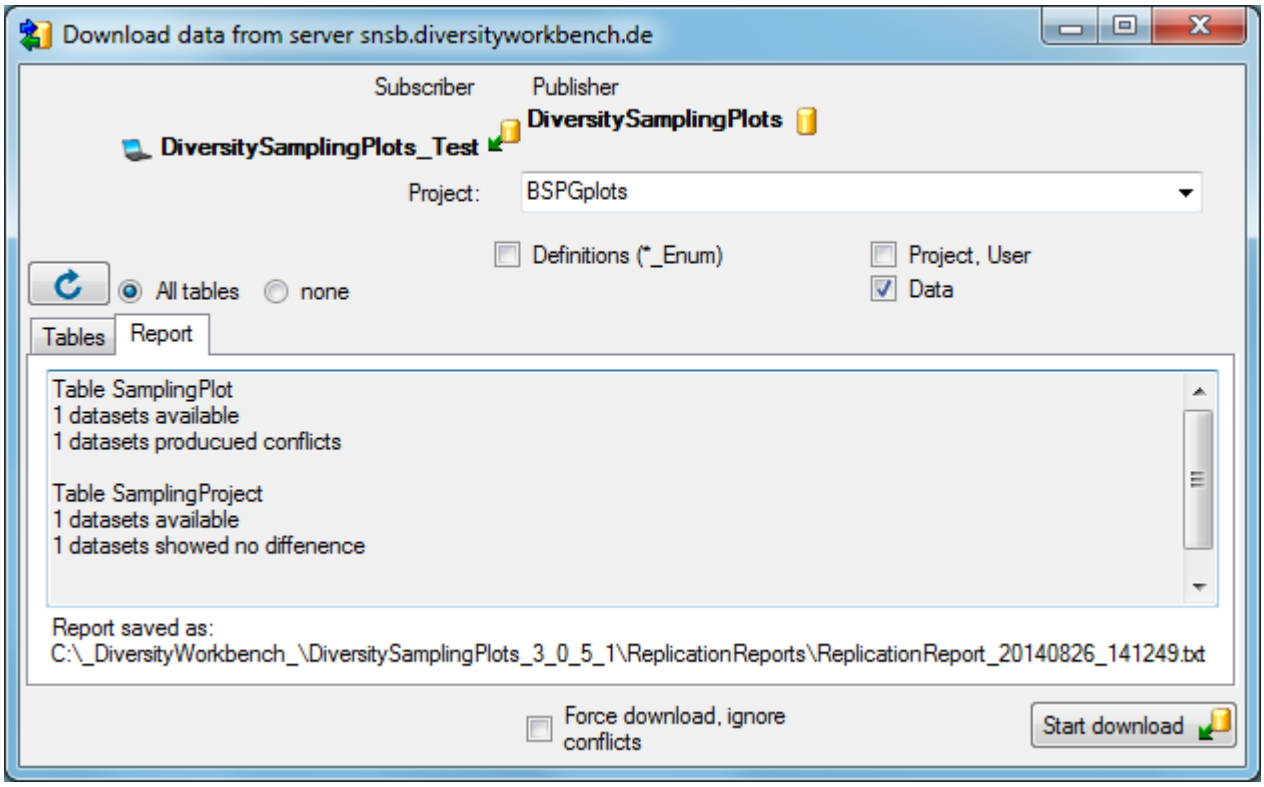
Click on the button to open a window where you can choose between the two versions of the data as found in the *publisher* and the *subscriber* database.



The conflicting columns are marked red. For text values the program will create a combination of both values (see above) for a merged version of the data. Choose the prefered version and click **Solve conflict** ✓button. If you can not solve a conflict, use the **Stop conflict resolution** ⊗button respectively.

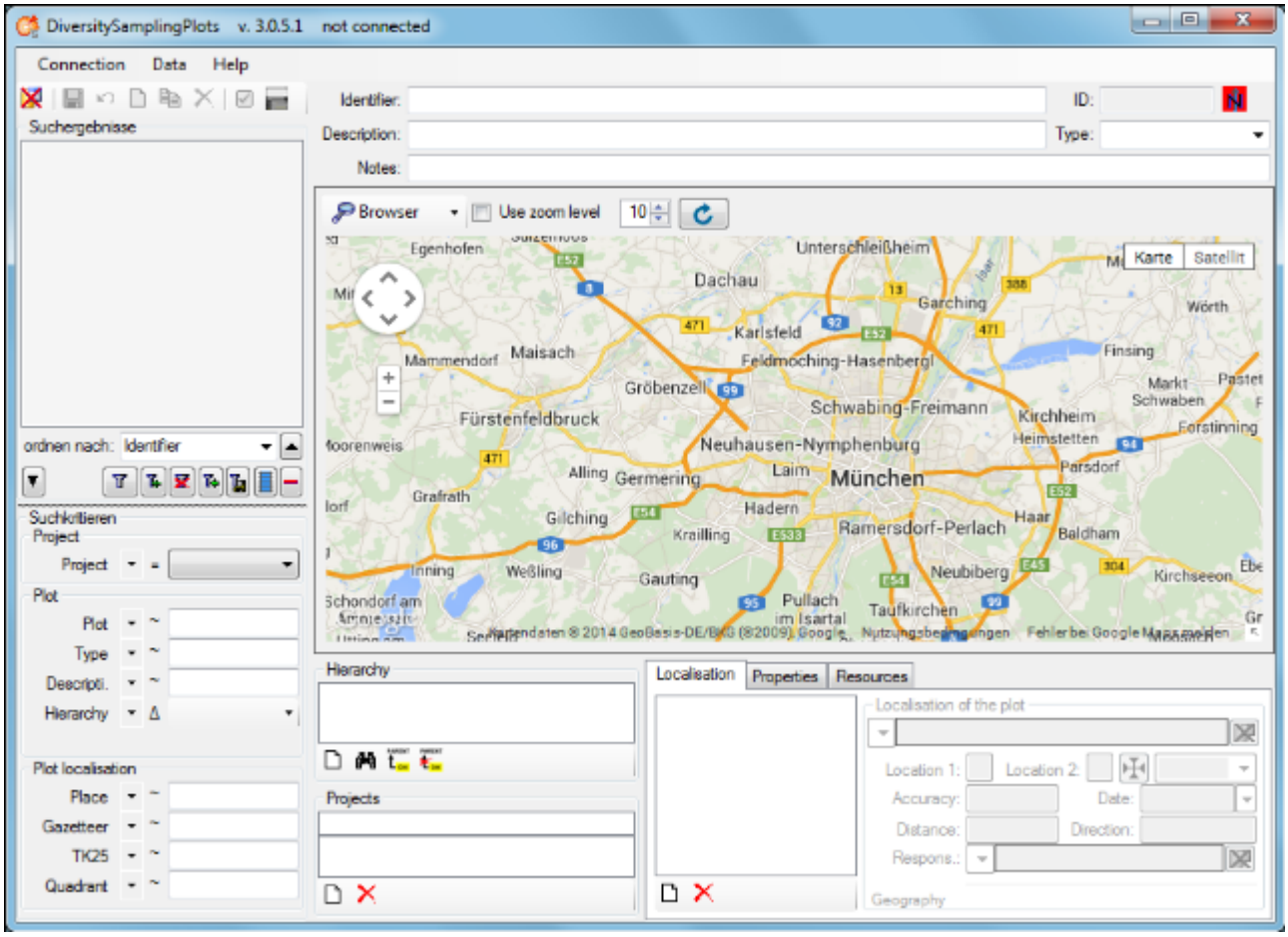
Report

At the end of each transfer a report will be created with a summary for every table which has been included.

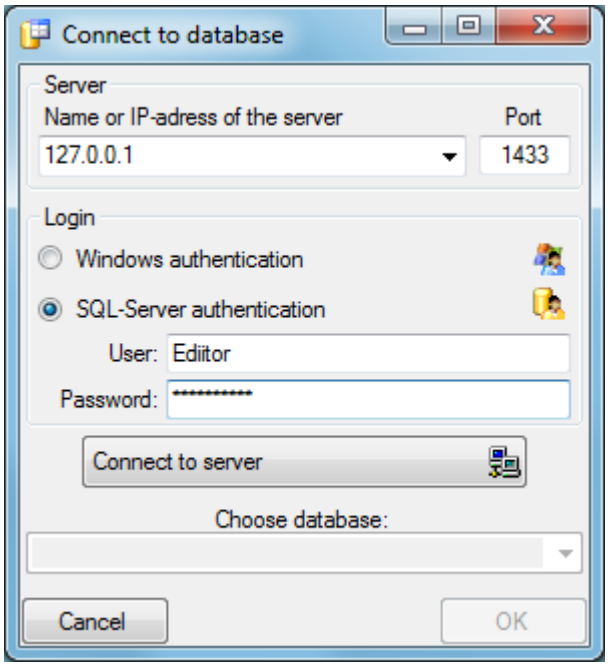


Tutorial - first steps

This tutorial will guide you through the first basic steps in DiversitySamplingPlots. After the installation, make sure, you have access to the database. To start the programm, double click on the DiversitySamplingPlots.exe in the directory where you copied the files of DiversitySamplingPlots. The main window will open.



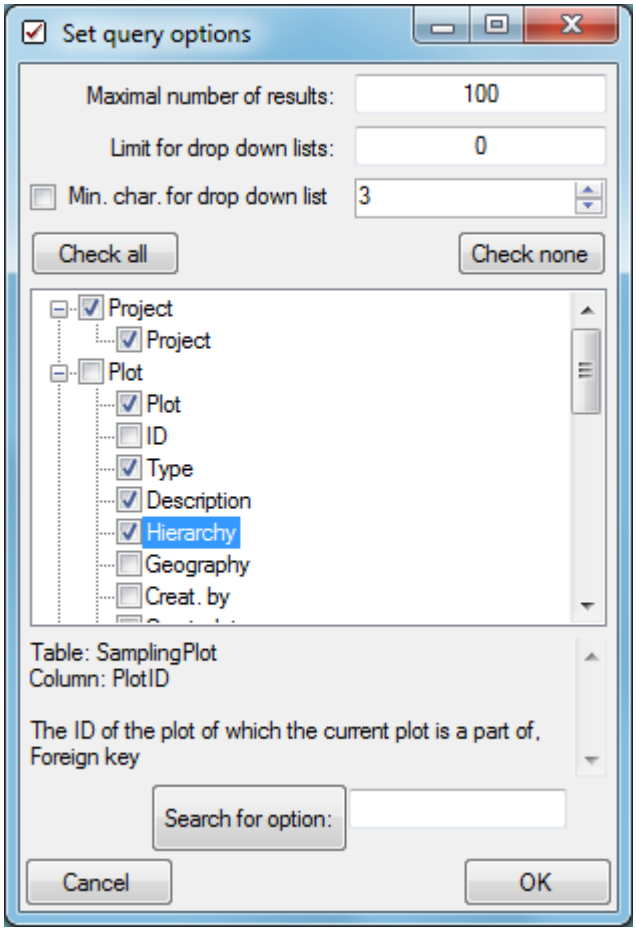
If you open this window for the first time, you have to connect to the database. Click on the button or choose **Connection -> Database...** from the menu to open a window where you can enter your account information and choose the database (see image below, for further informations see database access).



After connecting to the server and choosing a database click on the **OK** button to return to the main form. As indicated by the symbol in the right upper corner, you are now connected to the database. The tooltip of the button will show your current login informations.

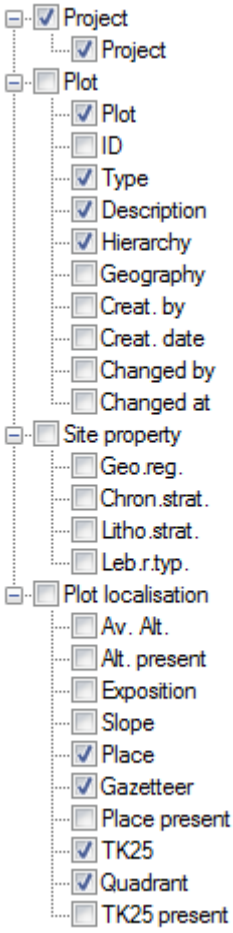
Tutorial - query

To search for data in the database, use the query section in the left part of the window. To select the query conditions, click on the ☑button in the top panel. A window as shown below will open.

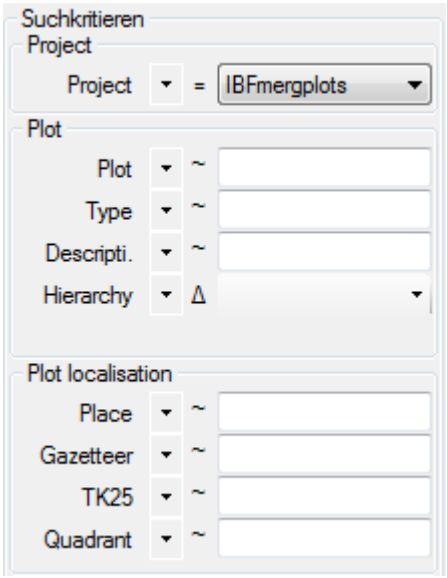


With the **Maximal number of results**, you can limit the paket size that should be retrieved from the server. For a slow connection to the database server choose a low value (e.g. 100 as set by default).

Select the desired entries, e.g.:

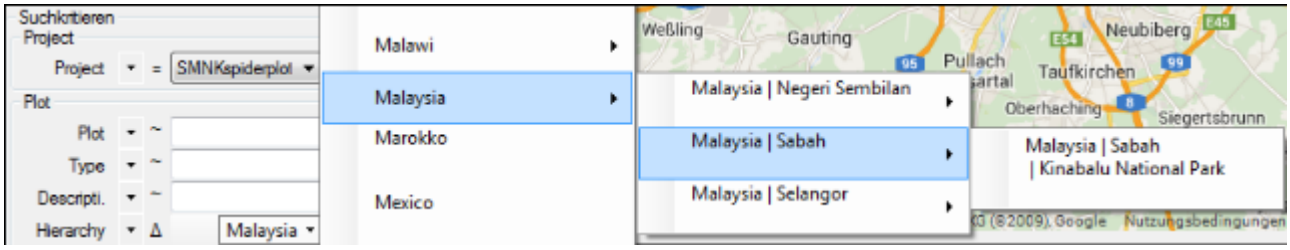


Click OK to close the window. Your query conditions will look like the image below.



Within the query options you have several possibilities to specify your search restriction. Use the drop down button  to change between the operators.

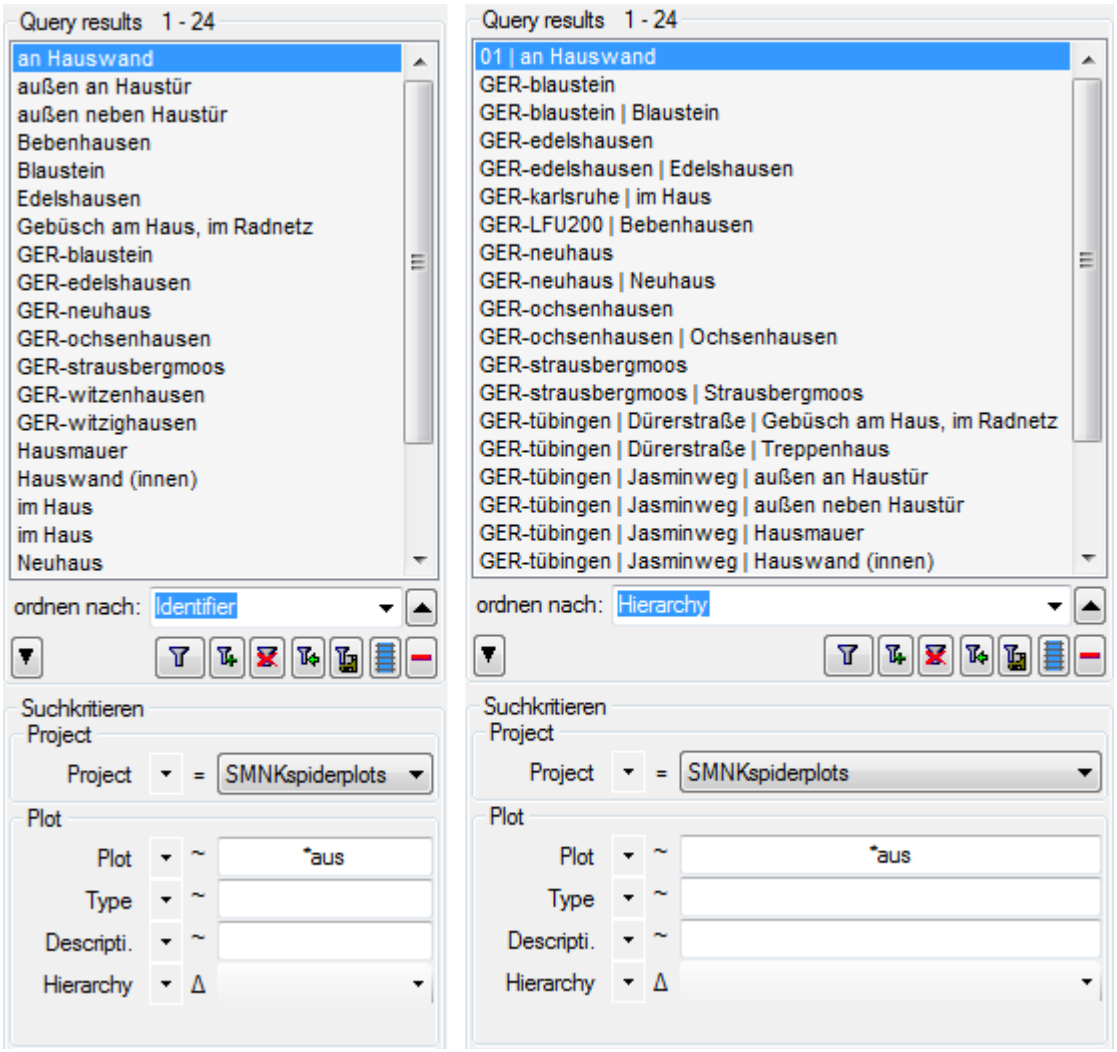
If the hierarchy operator Δ is selected, you may choose a desired hierarchy node by clicking at the drop down box on the right. Then a tree view of the current hierachy pops up, where you can select a given node with the mouse:



After all query conditions are set, click on the button to start the query. In the result list all plots will be displayed which matches your query and the selected maximal number of results.

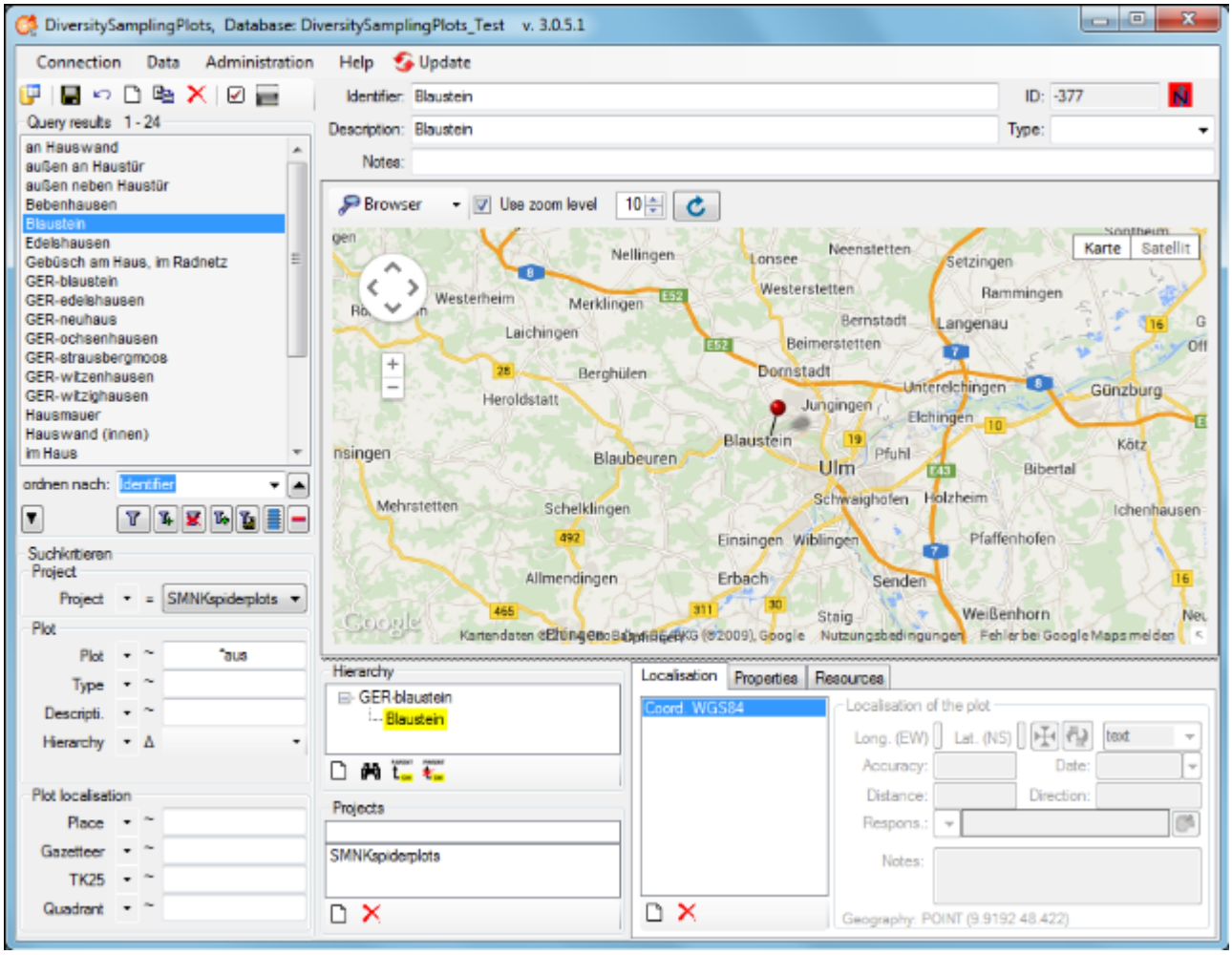
Tutorial - query results

Pressing the button will display all plots in the list box which matches the query conditions and the selected maximal number of results:



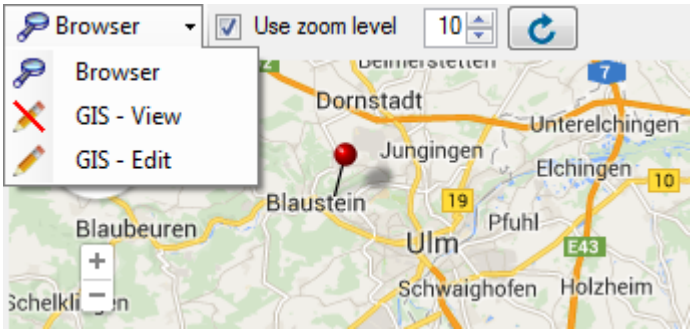
The kind of entries to be shown can be selected in the "order by" list box. They may be the plot identifiers, the plot descriptions or the plot hierarchy strings.

The data of the selected plot (identifier, description, ID, type, notes etc.) is displayed right of the query area. If a geography has been assigned, the place is shown on the map in the middle. The plot identifier is marked with yellow background, embedded in the hierarchy tree in the box below the map.


DiversitySamplingPlots, Database: DiversitySamplingPlots_Test v. 3.0.5.1
Connection
Data
Administration
Help
Update
Identifier: Blaustein
ID: -377
Description: Blaustein
Type:
Notes:
Query results 1 - 24
an Hauswand
außen an Haustür
außen neben Haustür
Bebenhausen
Blaustein
Edelshausen
Gebüsch am Haus, im Radnetz
GER-blaustein
GER-edelshausen
GER-neuhaus
GER-ochsenhausen
GER-strausbergmoos
GER-witzenhausen
GER-witzighausen
Hausmauer
Hauswand (innen)
im Haus
ordnen nach: Identifier
Suchkriterien
Project
Project = SMNKspiderplots
Plot
Plot ~ *aus
Type ~
Descripti. ~
Hierarchy Δ
Plot localisation
Place ~
Gazetteer ~
TK25 ~
Quadrant ~
Browser
Use zoom level
10
Karte
Satellit
Nellingen
Lonsee
Neenstetten
Setzingen
Westerheim
Merklingen
Westerstetten
Rammingen
Laichingen
Bernstadt
Langenau
Beimerstetten
Berghülen
Dornstadt
Unterelchingen
Günzburg
Heroldstatt
Jungingen
Elchingen
Blaustein
Blaubeuren
Ulm
Pfuhl
Kötz
Bibertal
Mehrstetten
Schelklingen
Schwaighofen
Holzheim
Ichenhausen
Einsingen
Wiblingen
Pfaffenhofen
Allmendingen
Erbach
Senden
Staig
Weißenhorn
Hierarchy
GER-blaustein
Blaustein
Projects
SMNKspiderplots
Localisation
Properties
Resources
Coord. WGS84
Localisation of the plot
Long. (EW)
Lat. (NS)
text
Accuracy:
Date:
Distance:
Direction:
Respons.:
Notes:
Geography: POINT (9.9192 48.422)

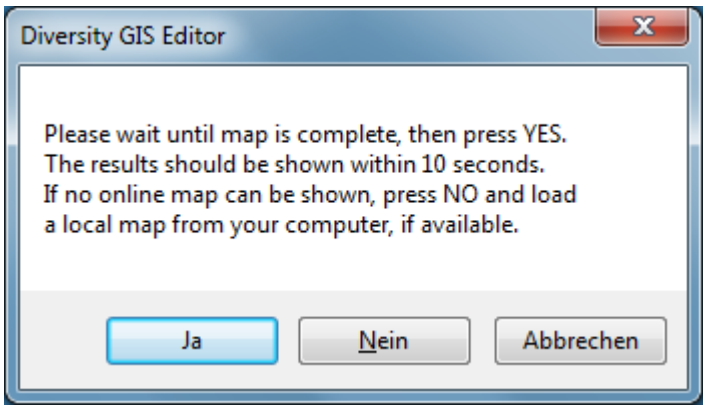
Tutorial - show plots on the maps

The results list box displays the current set of plots found by the database query. To show a certain plot on the map, just click at the entry. Due to the coordinates of the place the map will be adjusted to this area and build up. There are 3 choices how to display the plot: **Browser**, **GIS - View** and **GIS - Edit**:

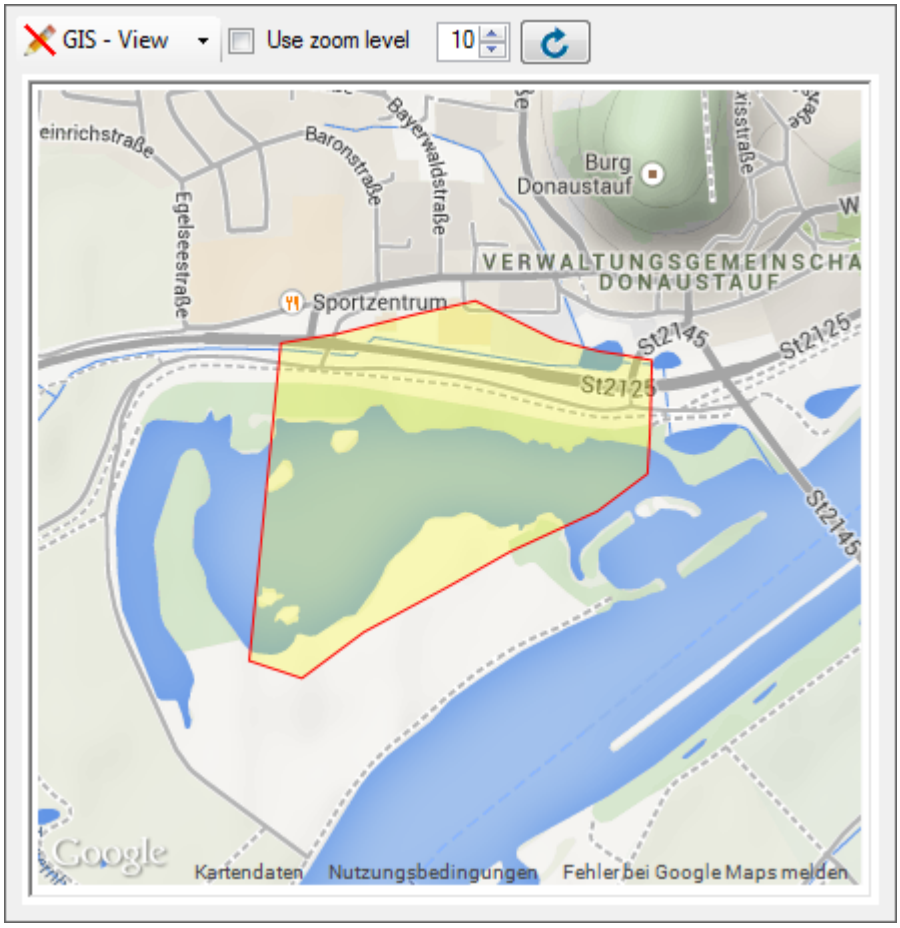


Browser uses a GoogleMaps window and pins to show the geography of the plot, if any. This is rather fast and interactive, but there is currently no support of areas or line strings and no possibility to display more than one plot.

GIS - View uses the powerful GIS Editor tool of the Diversity Workbench, which can handle all kinds of geographies and display distribution maps of multiple plots. Depending on the internet connection and the map server it can take some seconds until the map tiles have been build. A message box will pop up to advice the user to wait, until the map is complete:

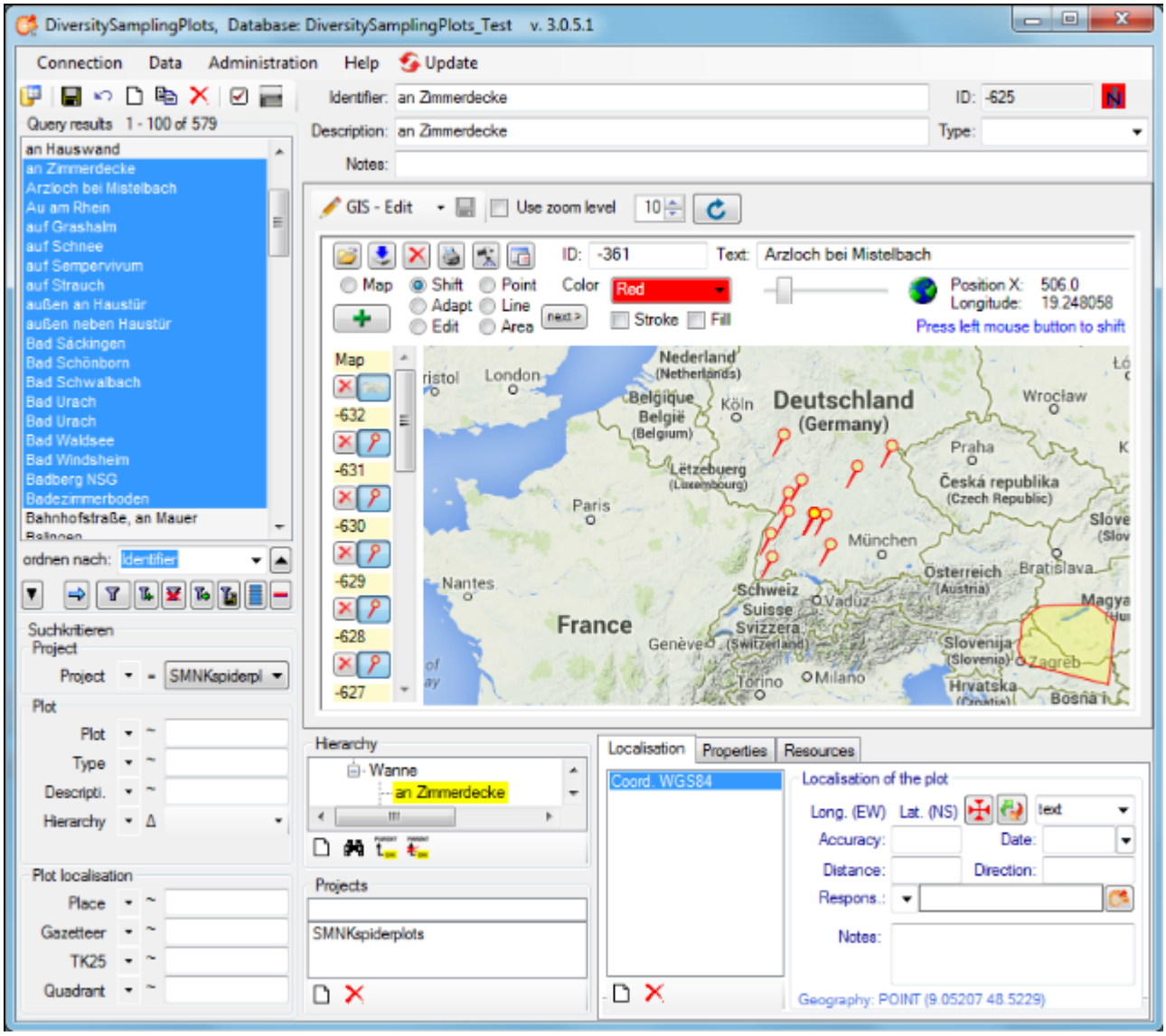


When all tiles of the background map are drawn, press OK to continue. Then the online map will be scanned and frozen and the plots should appear on the map:



Be aware that this mode is just a viewer of the GIS Editor's geography objects. If multiple plots have been selected in the query list box, press the reload button to display them. If you want a certain zoom level for the map, select the Use zoom level check box and adjust the desired level.

GIS - Edit provides all controls and capabilities of the GIS Editor including editing the sample plot. Select a plot in the query list, then the map will be adjusted and a message box will pop up according to the GIS - View mode. Press OK to add the map and the plot to the sample list and display the geography:


DiversitySamplingPlots, Database: DiversitySamplingPlots_Test v. 3.0.5.1
Connection
Data
Administration
Help
Update
Identifier: an Zimmerdecke
ID: -625
Description: an Zimmerdecke
Type:
Notes:
Query results 1 - 100 of 579
an Hauswand
an Zimmerdecke
Arzloch bei Mistelbach
Au am Rhein
auf Grashalm
auf Schnee
auf Sempervivum
auf Strauch
außen an Haustür
außen neben Haustür
Bad Säckingen
Bad Schönborn
Bad Schwalbach
Bad Urach
Bad Urach
Bad Waldsee
Bad Windsheim
Badberg NSG
Badezimmerboden
Bahnhofstraße, an Mauer
ordnen nach: identifier
Suchkriterien
Project
Project: SMNKspiderpl
Plot
Plot
Type
Descripti.
Hierarchy
Plot localisation
Place
Gazetteer
TK25
Quadrant
GIS - Edit
Use zoom level
10
ID: -361
Text: Arzloch bei Mistelbach
Map
Shift
Point
Adapt
Line
Edit
Area
next >
Color
Red
Stroke
Fill
Position X: 506.0
Longitude: 19.248058
Press left mouse button to shift
Map
-632
-631
-630
-629
-628
-627
Nederland (Netherlands)
Belgique België (Belgium)
Köln
Deutschland (Germany)
Wrocław
Praha
Česká republika (Czech Republic)
Lëtzebuerg (Luxembourg)
Paris
München
Österreich (Austria)
Bratislava
Schweiz Suisse Svizzera (Switzerland)
Vaduz
Nantes
France
Genève
Slovenija (Slovenia)
Zagreb
Torino
Milano
Hrvatska
Hierarchy
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Projects
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Localisation
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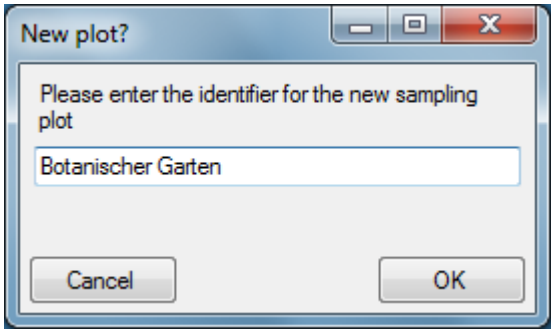
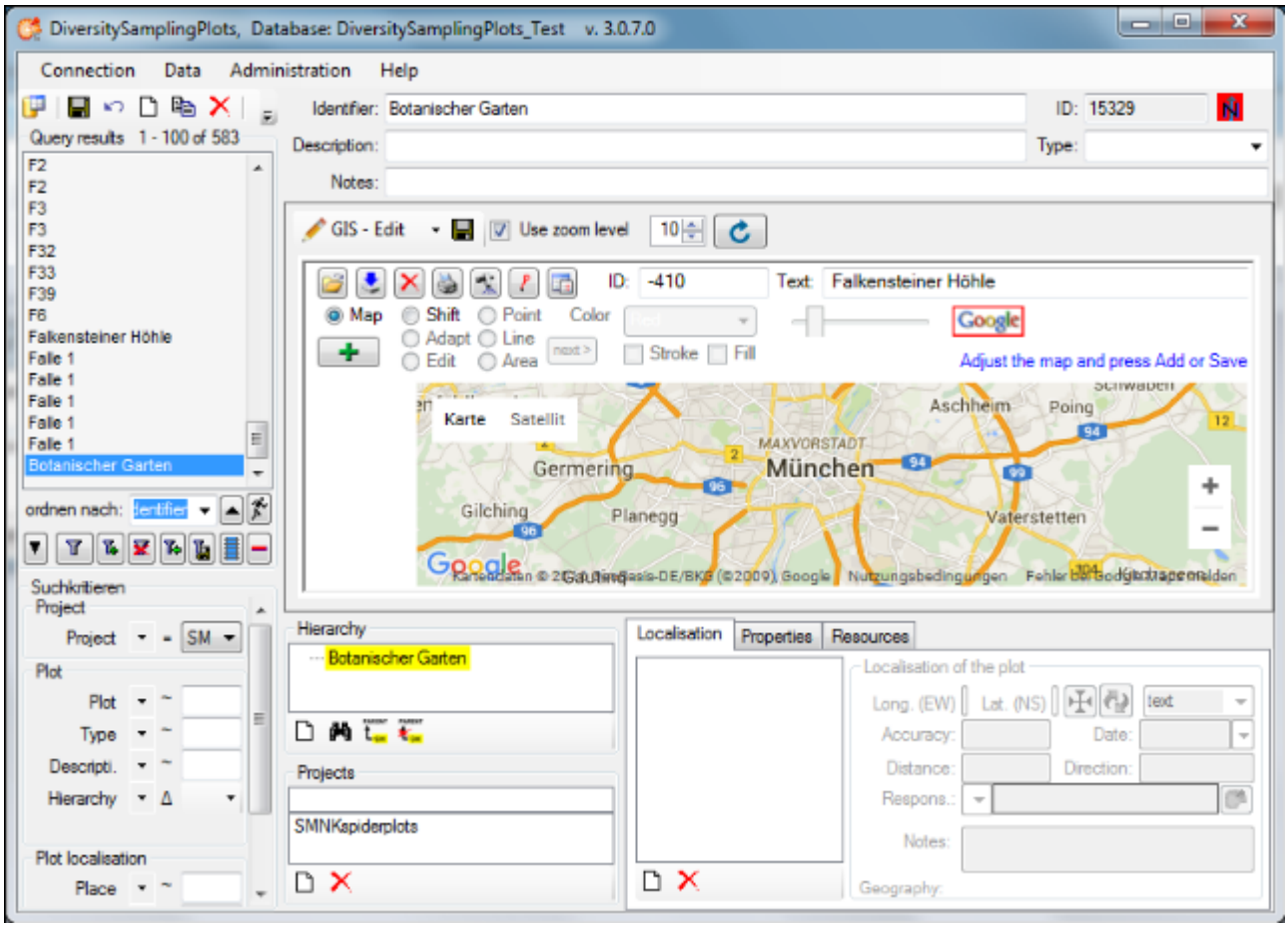
Localisation of the plot
Long. (EW)
Lat. (NS)
text
Accuracy:
Date:
Distance:
Direction:
Respons.:
Notes:
Geography: POINT (9.05207 48.5229)

Tutorial - create or change plots

To create a new sampling plot click at the icon of the tool bar. A Window will pop up and ask you to enter the identifier of the new plot.

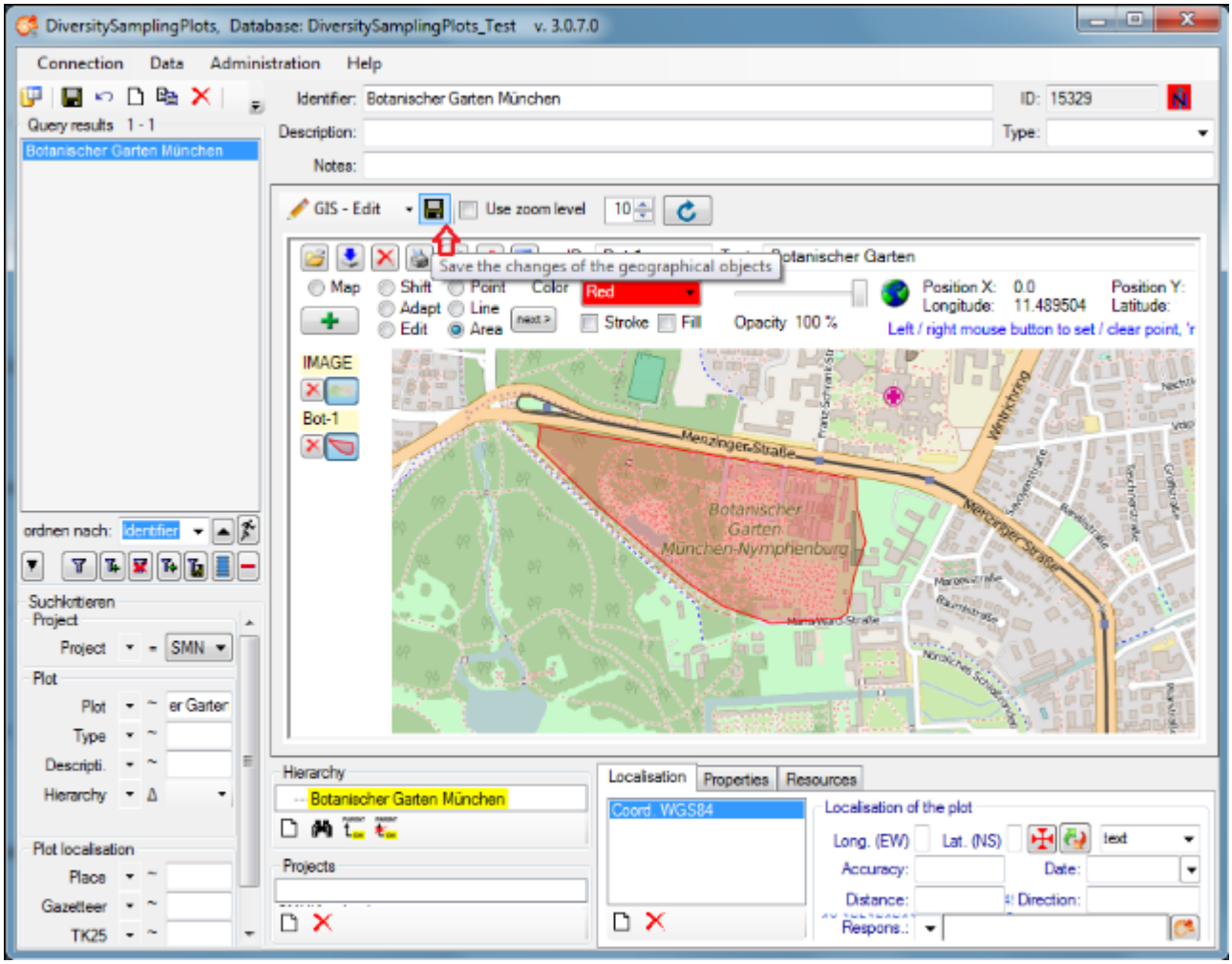


The new plot will be created and shown on the screen.

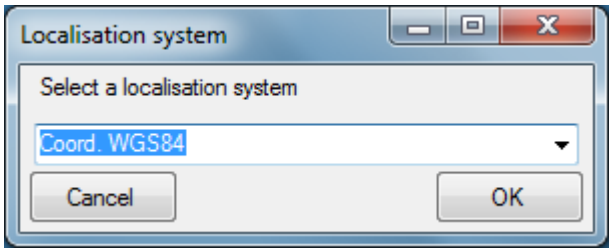


Now you may edit the parameters and either add a geography of any kind using the GIS-Editor window or a certain point with WGS84 coordinates using the Localisation control.

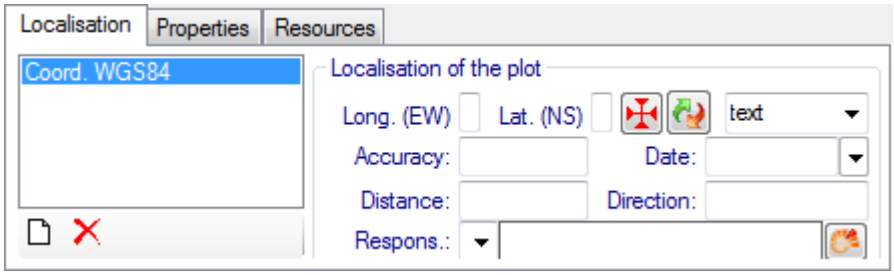
For the usage of the GIS-Editor please see the Description in the second part of the help file. You may select an appropriate map style, navigate to your region of interrest by shiftig and zooming the map and create it as a background map by clicking the button. Then select Point, Line or Area mode and draw your geography on the background map. Add one or more geographies using the button. The geographies may be changed later on using the Edit mode of the GIS-Editor. Finally save the geography to the database by clicking on the button of the **GIS-Edit window (not that of the Query toolbar!)**. A WGS84 localisation will be created automatically.



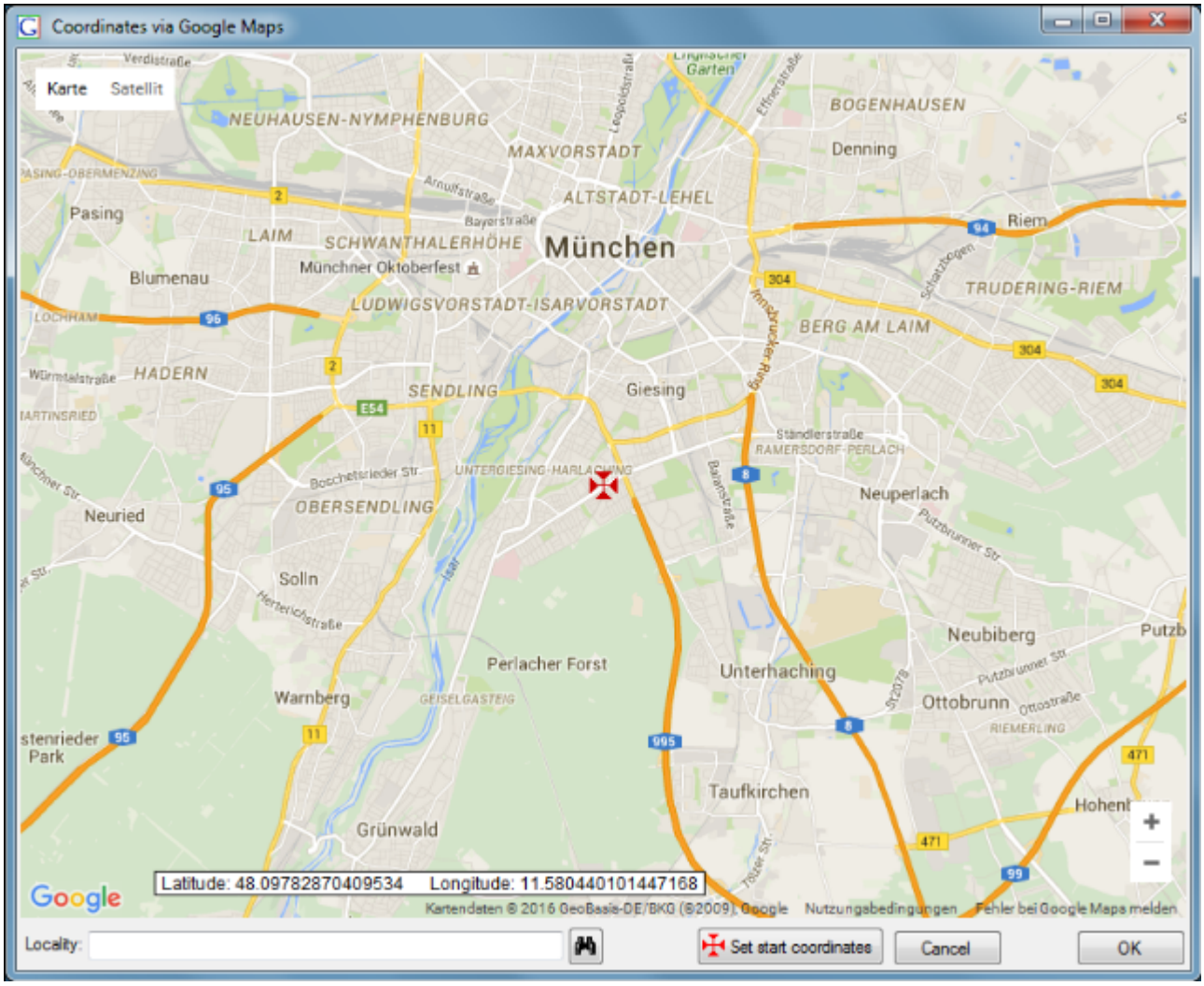
Alternatively you may create a WGS84 localisation using the button in the Localisation tab below the GIS-Edit window. A dialog will pop up.



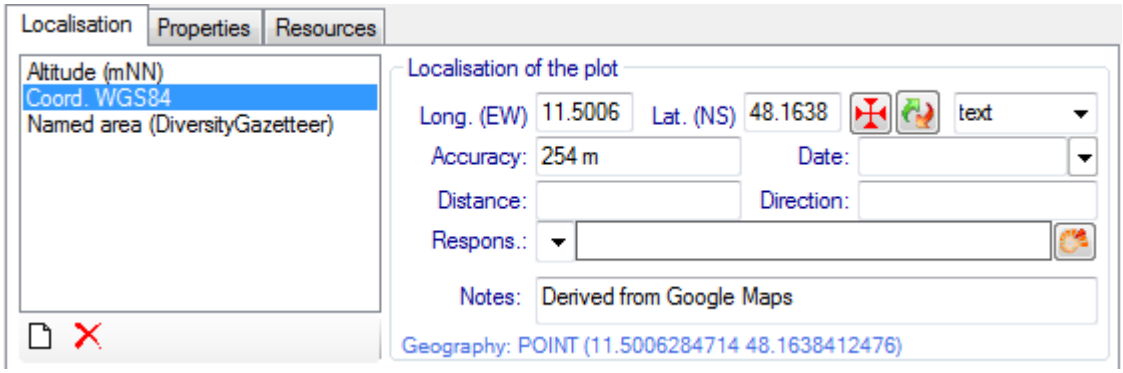
Select "Coord. WGS84" from the drop down list and then press the OK butten. The new localisation will be shown in the list of the Localisation tab.



Select the localisation in the list and click at the button. The coordinates window as known from other DiversityWorkbench modules will be shown.



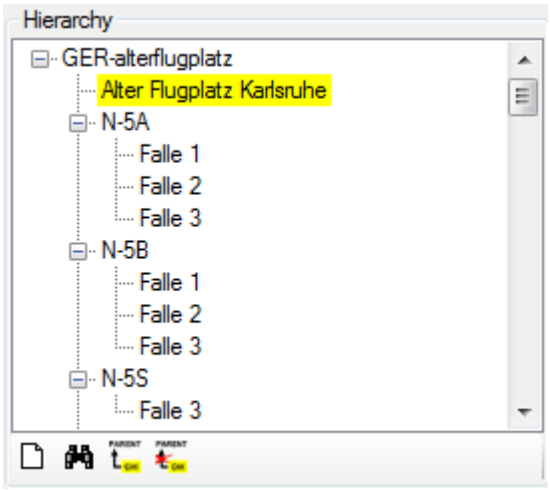
Shift the map using the mouse to localise a certain coordinate point with the static cross in the center. Then press the OK button and the coordinate point will be shown in the WGS84 localisation tab.



Additionally an Altitude and a Named area localisation will be created automatically by calling the Geonames web service. Press the button **of the Query toolbar** to save the new localisation.

Tutorial - plot hierarchy

The plots may be hierarchical organised as a tree view. The location of the current plot within the hierarchy is displayed in the hierarchy window:



To add a new plot within the selected plot click on the button.

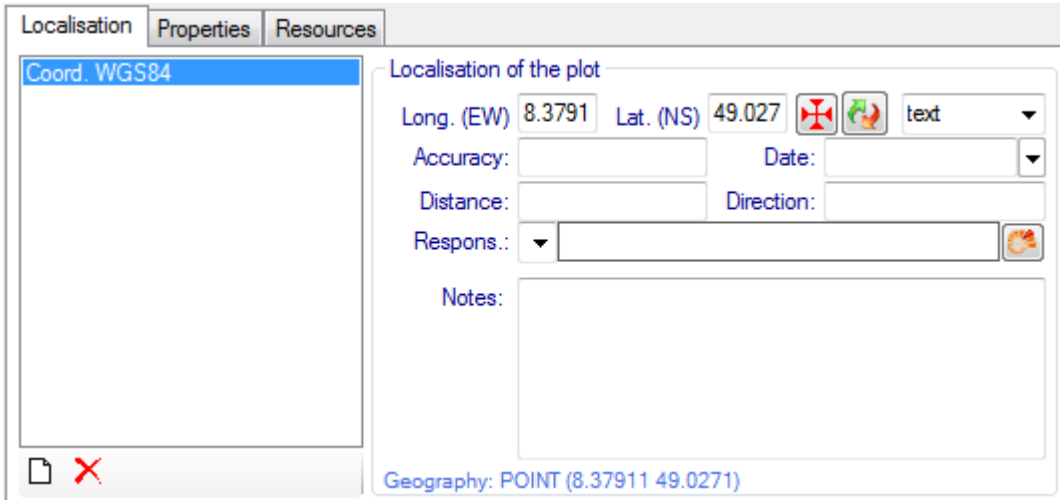
To change to another plot within the hierarchy tree just select the plot in the tree view and click on the button. The new plot will be displayed.

To set the superior plot for the current sampling plot click on the button.

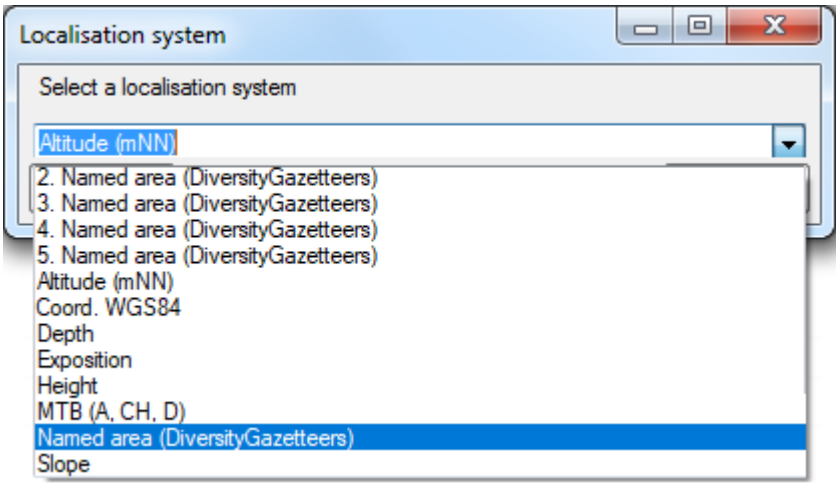
To remove the superior plot for the current sampling plot click on the button.

Tutorial - localisation

Different kinds of localisation may be assigned to the sampling plots:



To add a new localisation for the selected plot click at the button. Select the desired kind of localisation from the drop down list and press the **OK** button.



Fill up the data fields in the right part of the window. Each kind of localisation can only be assigned once. The list will contain the remaining choices.

Some buttons are provided depending on the selected localisation:

: Open a GoogleMaps window to select the coordinates.

: Convert coordinates to another coordinate system.

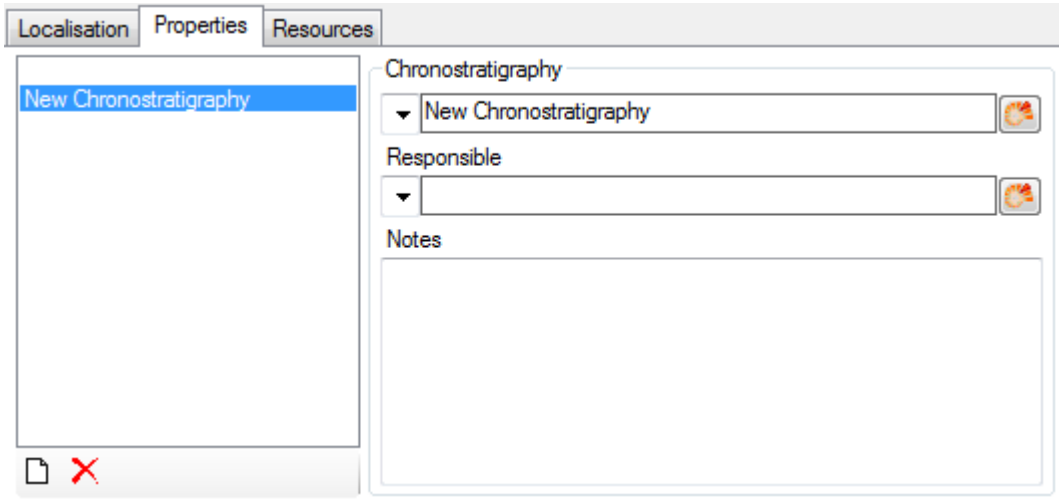
: Open an appropriate Diversity Workbench remote module.

To remove a localisation, select it and click at the button. The localisation will disappear from the list.

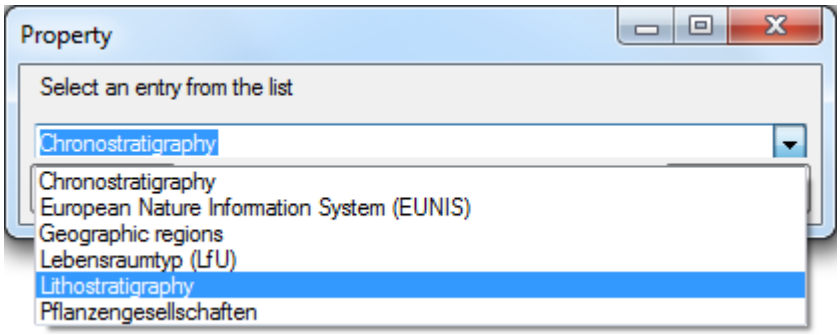
Finally press the item in the Query toolbar to store the localisation for the plot in the database.

Tutorial - properties

Some kinds of properties may be assigned to the selected sampling plot.



To add a new property for the selected plot click at the button. Select the desired kind of property from the drop down list and press **OK**.



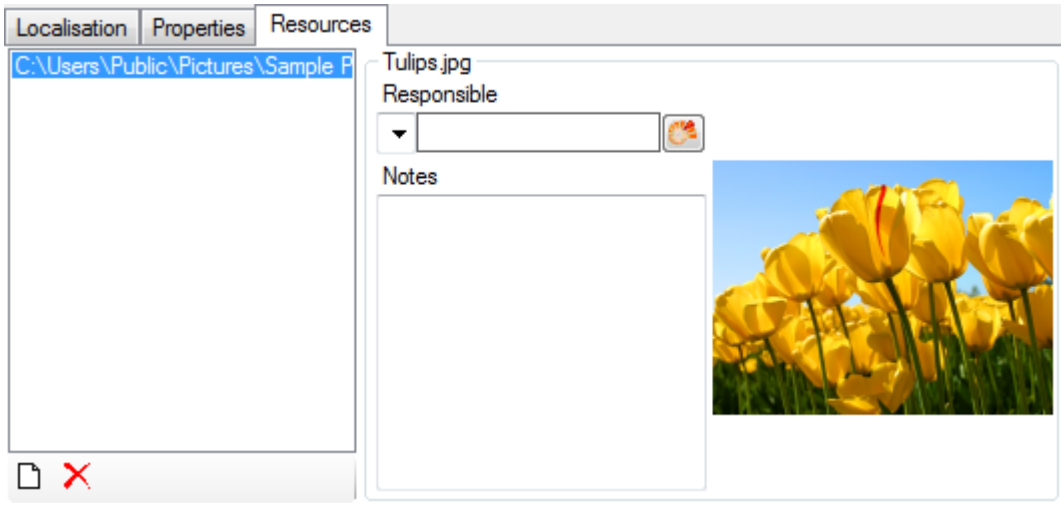
Press the button to open an appropriate Diversity Workbench remote module for the property data.

To remove a property, select it and click at the button. The property will disappear from the list.

Finally press the item in the Query toolbar to store the properties for the plot in the database.

Tutorial - resources

Resources (e.g. pictures) may be assigned to the selected sampling plot.



To add a new resource click at the button. A browser will open where you can select and add the desired file.

Press the button to open the DiversityAgents remote module, where you may select the responsible for the resource data. Annotations may be entered in the Notes field.

To remove a resource, select it and click at the button. The resource will disappear from the list.

Finally press the item in the Query toolbar to store the resource settings for the plot in the database.

GIS Editor

Introduction

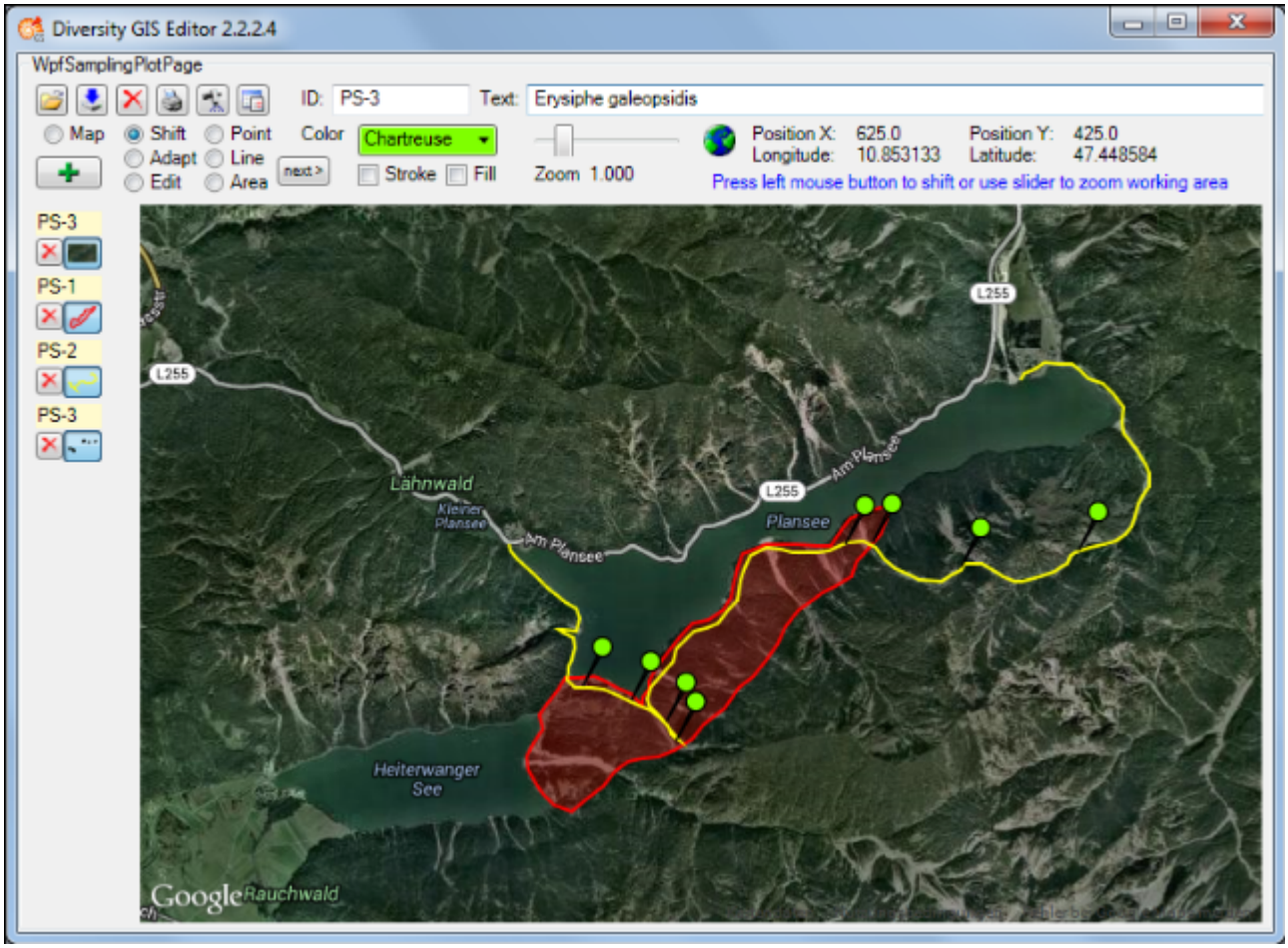
The Diversity GIS Editor is a tool to create, visualize, edit and archive samples within a geographical environment. It may be used as a stand-alone application or as a component of the Diversity Workbench by other applications, e.g. DiversityCollection or DiversitySamplingPlots.

In combination with a background map, equipped with world coordinates, collections of Microsoft SQL Geometry Objects (points, lines and areas) may be displayed and edited in their geographical context. The screen and world coordinates of the objects will be calculated and shown in the status line. Color, thickness and transparency of the elements can be adjusted. The working area which keeps the maps and objects may be shifted or zoomed.

The background map could either be loaded from a storage device or created with an online map server tool provided by the editor. Other maps without world coordinates may be adjusted to the background map easily by setting 3 pairs of reference points on the background and the new map. The calculated world coordinates will be assigned and stored when the new map is saved.

A GPS functionality has been integrated. If a GPS device is connected, the current position will be displayed and - if an applicable background map is loaded - marked on the map.

The data transfer between application and GIS editor is made by interface function calls. In that way geometry objects of a Diversity database may be loaded to the editor, modified or extended and sent back to the application, which then updates the data base.

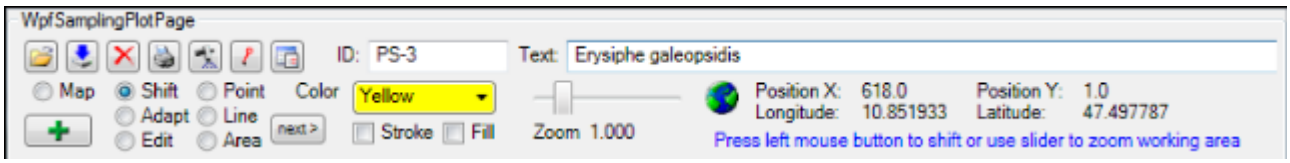


Chapter 1: GIS Editor Layout

The layout of the Diversity GIS Editor could be divided into 3 regions:

- Control Panel
- Sample List
- Working Area

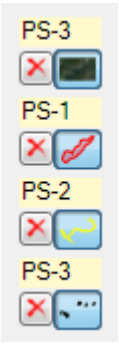
Control Panel



The Control Panel consists of the following elements:

- 8 buttons to load, save, delete, print or add samples, switch GPS, detect samples and to open the Settings window
- 2 text boxes for sample Identifier (ID) and Description (Text)
- 7 radio buttons to select the operation mode (Map, Shift, Adapt, Edit, Point, Line, Area)
- 1 button next > to switch to a new object, if the current sample is composed of multiple lines or areas
- 4 controls to adjust color and transparency of the samples (for stroke and fill) or to zoom the working area
- Status lines with screen and world coordinates (if any) and an appropriate symbol Google, OSM, or
- A hint about the user interaction, which is possible or expected

Sample List



The Sample List is the container for added maps or objects. Each entry is composed of the following elements:

- Identifier of the sample
- Delete button to remove the sample
- Toggle button to hide or show the sample

The toggle button is illustrated with a small picture of the associated sample. Switching these controls using the left mouse button will hide or show the corresponding sample. Using the right mouse button will effect all samples except the corresponding one and the background map:

- When right clicking on an active toggle button, all other samples will be switched off.
- When right clicking on an inactive toggle button, all other samples will be switched on.

If the number of samples in the list do not fit into the window area, a scroll bar will be displayed.

Working Area

This is the drawing space containing loaded maps and objects. In Shift mode the area could be moved or zoomed.

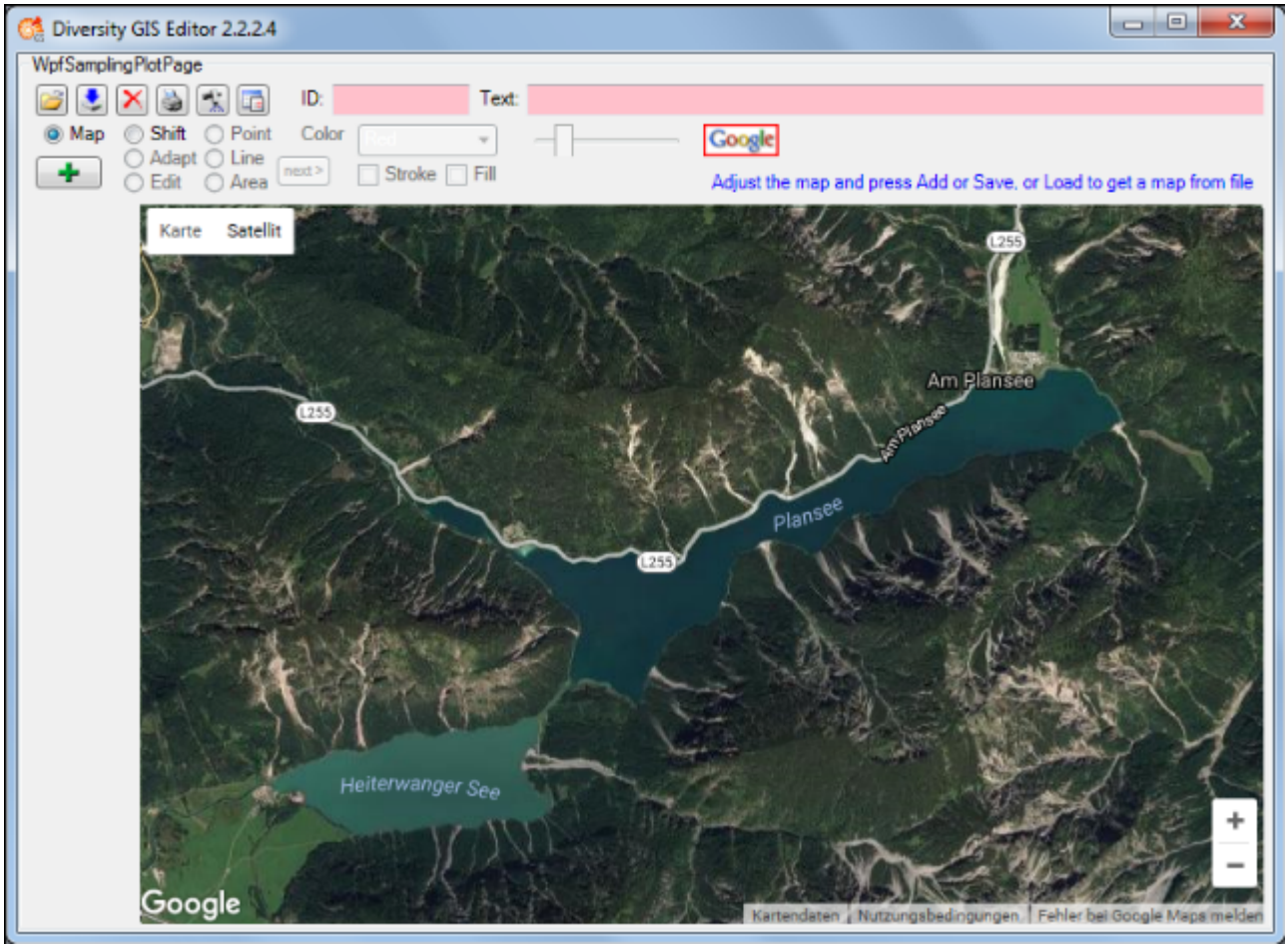
Chapter 2: GIS Editor Usage

The GIS Editor has 7 operation modes which are described in the following chapters:

- Map: Create an online map from the map server
- Shift: Move the working area with the mouse or zoom it with the slider
- Adapt: Calculate world coordinates for a new image using reference points of the background map
- Edit: Modify the current object and all visible samples of the Sample List
- Point: Create a number of object markers on the background map
- Line: Create a line string or a collection of line strings on the background map
- Area: Create an area or a collection of areas on the background map

When starting the GIS Editor as a stand-alone application the start-up operating mode usually is the Map mode. This is to remind the user that a background map with world coordinates is necessary to work with geographic objects.

Chapter 2.1: Map Mode



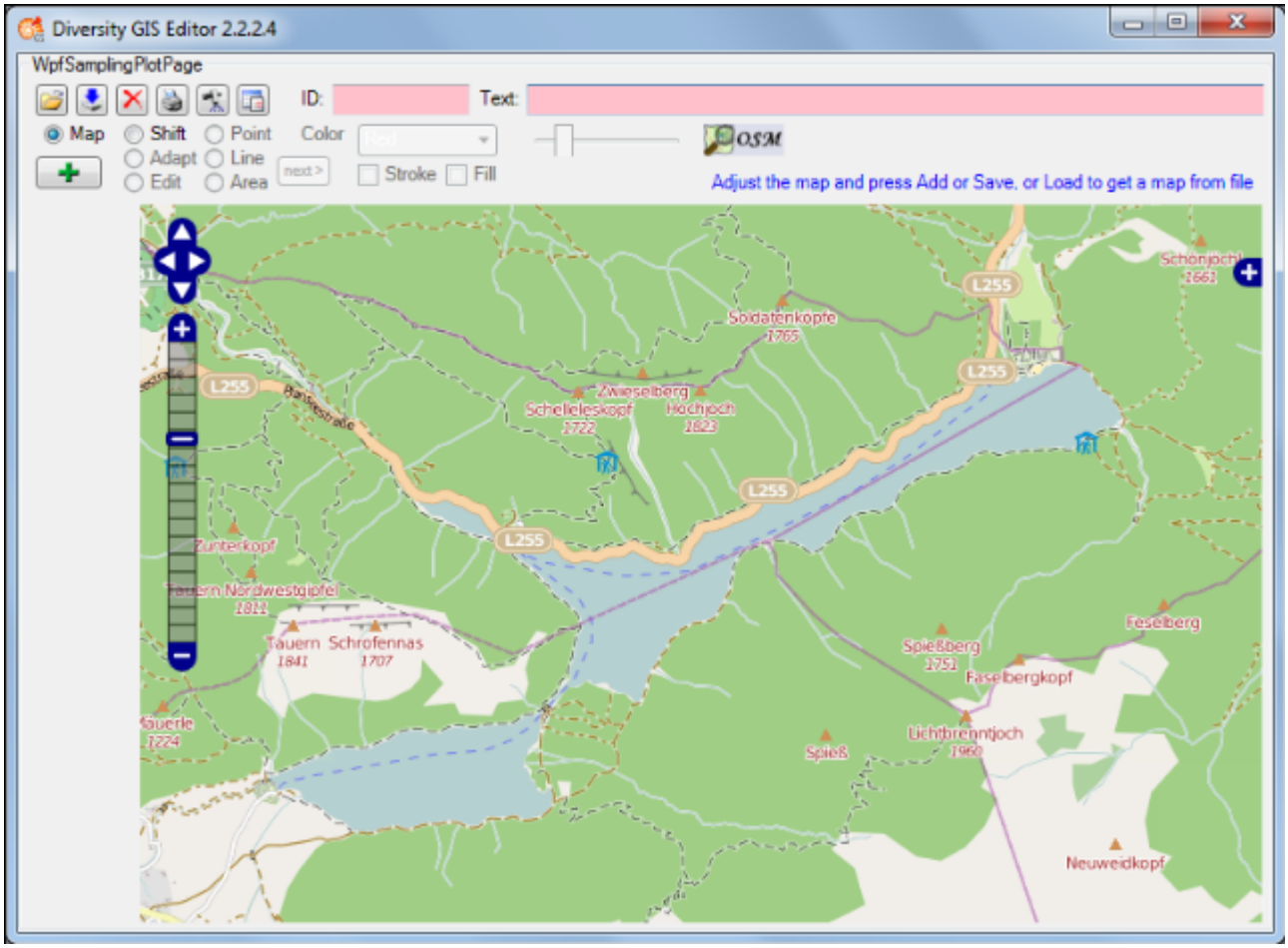
In Map mode the editor connects via Internet to the SNSB Google Maps service or alternatively to the Open Street Maps service, regarding on the GIS-Editor Settings, and displays an online map which can be moved, zoomed and switched as usual. The status area shows the Google or respectively the OSM symbol. The size of the map area adapts to the size of the working area, even when resizing the window.

In case of Google the controls for moving, zooming and map type are displayed by default. The overview window in the bottom right corner can be switched manually. The map can be adjusted to the user's needs as follows:

- Select map area: Press and hold left mouse button and move the mouse
- Zoom map: Turn the mouse wheel (if any), double click (left or right mouse button) on a location
- Switch map type: Use Google map type control
- Hide Google controls: Click right mouse button to hide, left mouse button to show them again

In case of Open Street Maps the pan and zoom control is displayed by default. It can be switched off or on by clicking the left mouse button anywhere within the map area. The layer switch control is hidden and can be opened by pressing the or closed again by pressing the button on the right side. The map can be adjusted to the user's needs as follows:

- Select map area: Press and hold left mouse button and move the mouse, or use the OSM pan control
- Zoom map: Turn the mouse wheel (if any), double click (left mouse button) on a location or use the OSM zoom control
- Switch map type: Open the layer switch and select a layer
- Hide or show pan and zoom control: Click left mouse button to toggle the control

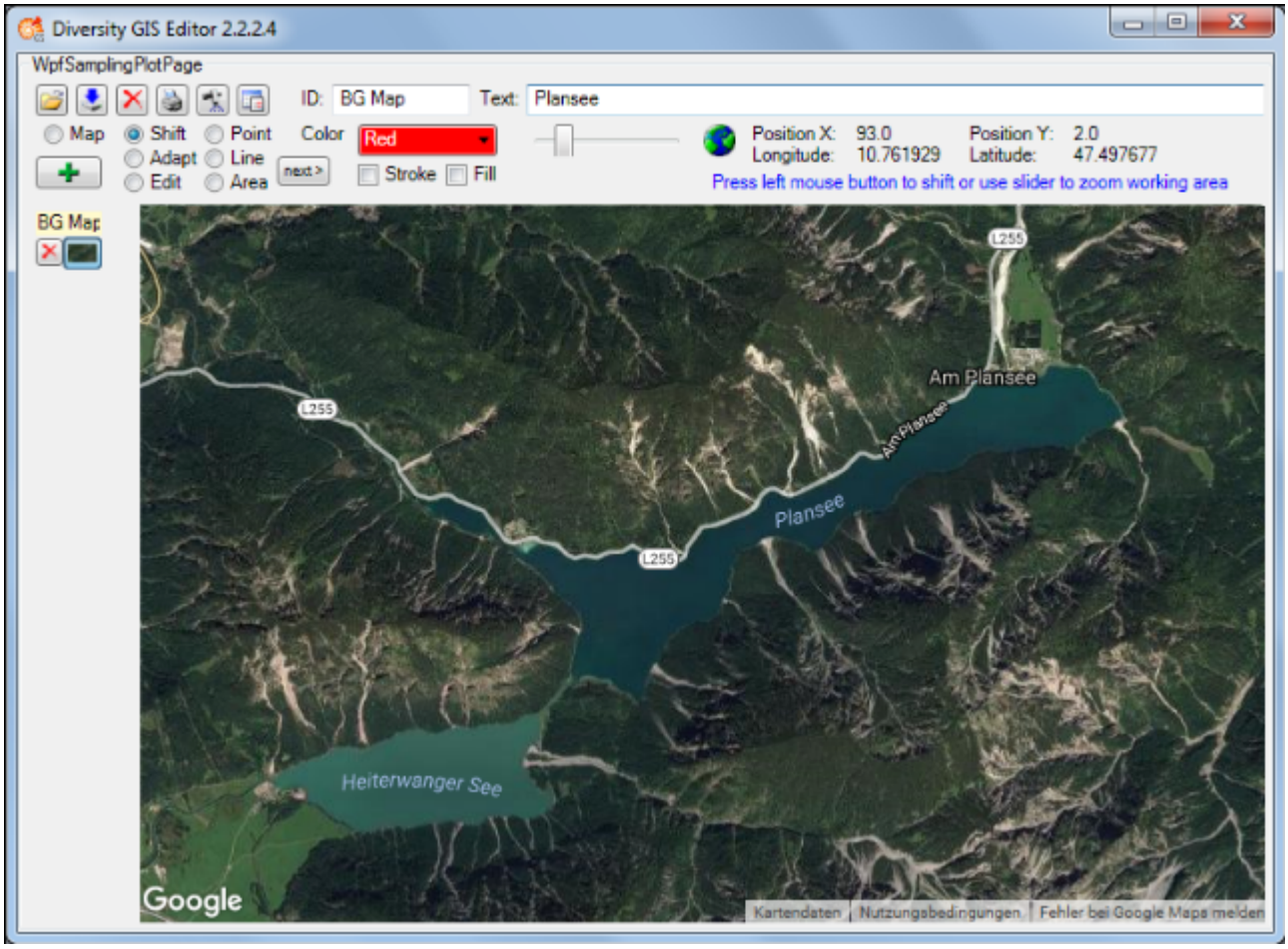


If an appropriate area has been selected, just press the Add button , then the area will be scanned and added to the Sample List as a reference map. A little image of the map will appear on the toggle button in the Sample List. The controls should be switched off before adding to get a neat map image.

Then the mode will be switched to Shift mode automatically and the status symbol will change to indicating that world coordinates are present. The screen and world coordinates will be shown in the status lines if the mouse is moved over the map surface.

The maps are subject to the Mercator projection, which is the GIS Editor's precondition for every bitmap used as a reference map. While the screen coordinates are linear in horizontal and vertical direction, the world coordinates are non linear in vertical direction.

Chapter 2.2: Shift Mode



This is the quasi default mode of the GIS Editor. The cursor changes to a move shape  when touching the background map. The map is "frozen" and exists as an image sample on the sample list. Changing the map region or resolution is no longer possible. But the Shift Mode provides 2 features:

- Move the working area
- Zoom the working area

Moving the working area

Press and hold the left mouse button and move the mouse to shift the working area within the display window. This is useful when having loaded a map from a storage unit which is larger than the GIS Editor's window, or in combination with zooming the working area.

Zooming the working area

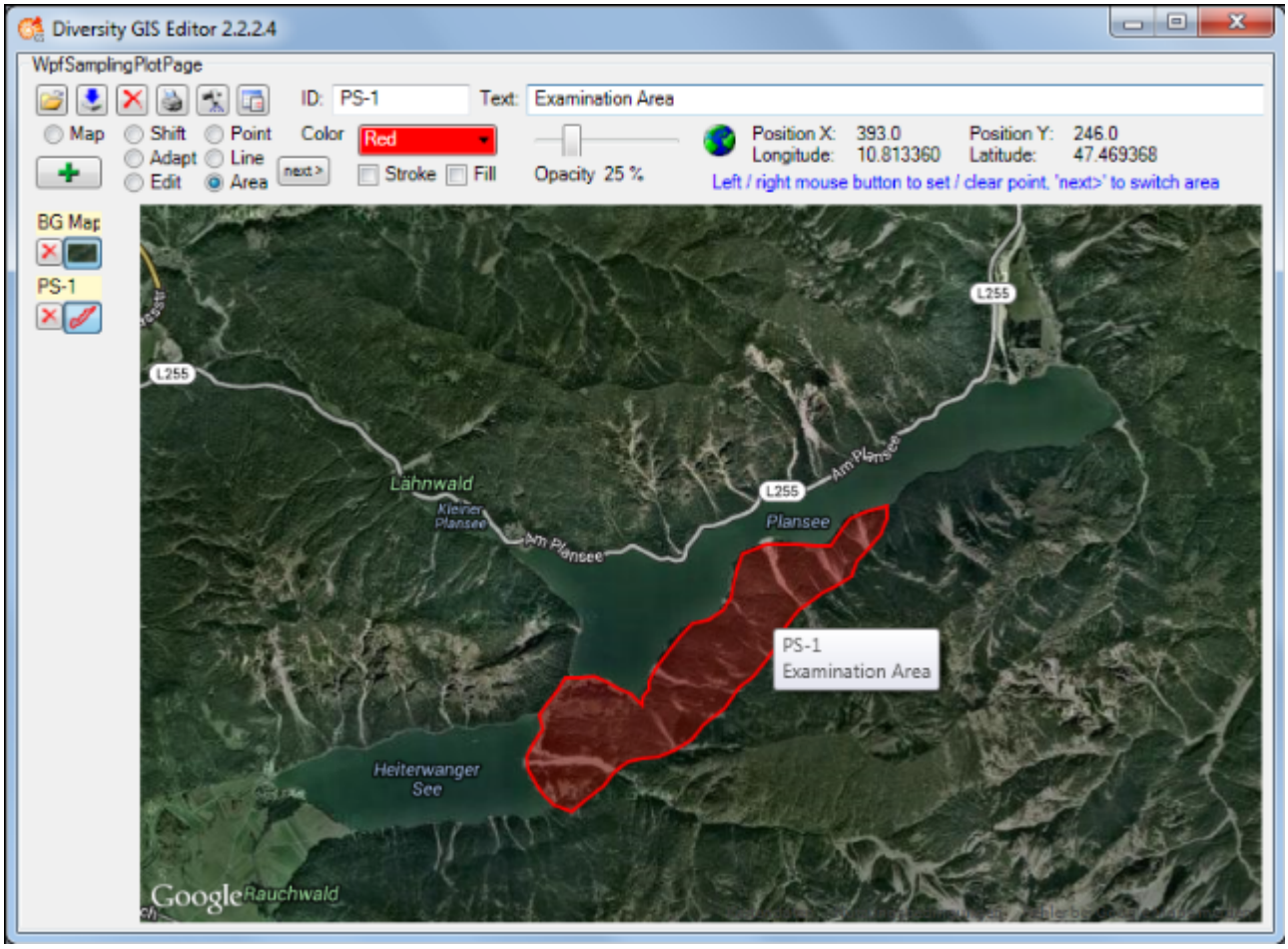
Place the mouse cursor at the slider control, press and hold the left mouse button and move the control left to zoom out or right to zoom in the working area. The range of the zoom is from factor 0.6 to 3.0. The current value is displayed beneath the zoom control. Double click the slider control to reset the zoom to default value 1.0.

Enlarging the working area makes it more easy to place objects precisely. The relevant area then could be selected by moving the zoomed working area. Downsizing the working area gives an overview of large map regions.

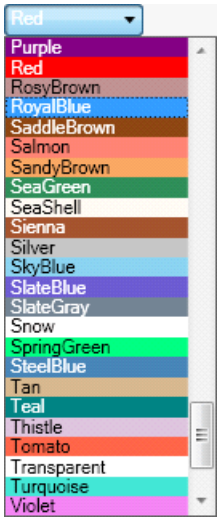
Note that the resolution of the map itself does not change any more when zooming in. But objects on the map are created in vector graphics, so the markers, lines or areas will remain sharp and clear while zooming. And they will adapt there thickness smoothly to the size.

Chapter 2.3: Area Mode

This mode is used to create areas (polygons) on the background map. The cursor changes to a cross line when touching the background map. Each click on the left mouse button sets a new point of the polygon. Every click on the right mouse button clears the last point set. The closed polygon defined by the points is displayed completely at any time. When holding the left mouse button the point can be placed while the lines of the polygon are shown as a "rubber band" display.



To create more than one area for a sample, just click the next > button. This will finish the current polygon and start another one. It could be repeated without limitation of the number of polygons.



Setting the color

The areas are created as filled polygons, this means they have a border line (stroke) and a filling. The color of stroke and filling can be set independently or simultaneously by clicking the appropriate check boxes beneath the Color list box. Clicking on the list box will open a drop down menu with the complete set of 141 predefined brushes. Use the scroll bar to navigate to the preferred color and select it with the left mouse button.

Setting the transparency

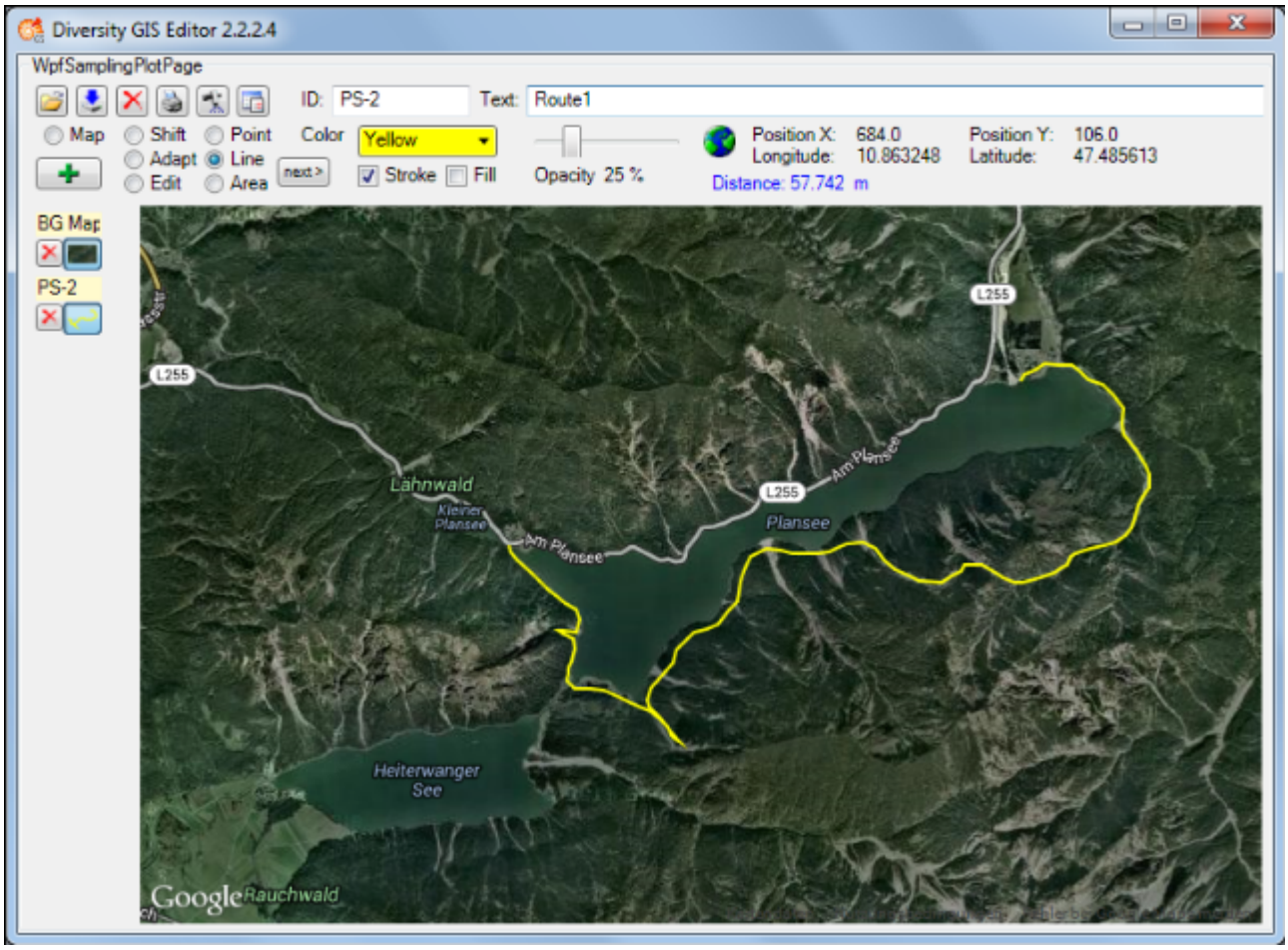
Besides the color the transparency of the area could also be set for stroke and filling. In each edit mode the slider control is used for that. The area stroke or filling changes smoothly from invisible at the left till completely opaque on the right slider position. The value beneath the slider control indicates the opaqueness in a range from 0% to 100%. The default settings are 100% for stroke and 25% for filling.

Before adding the polygon to the Sample List an Identifier (ID) and a Description (Text) should be written to the text boxes in the control panel.

Clicking the Add button will put the current area(s) as one sample into the Sample List. The toggle button will show a small picture of the first area of the sample. The ID will be displayed above the button. Furthermore a tool tip will be created for the sample holding the ID and Description, which will pop up when moving the mouse over the toggle button or over the polygon in the working area.

Chapter 2.4: Line Mode

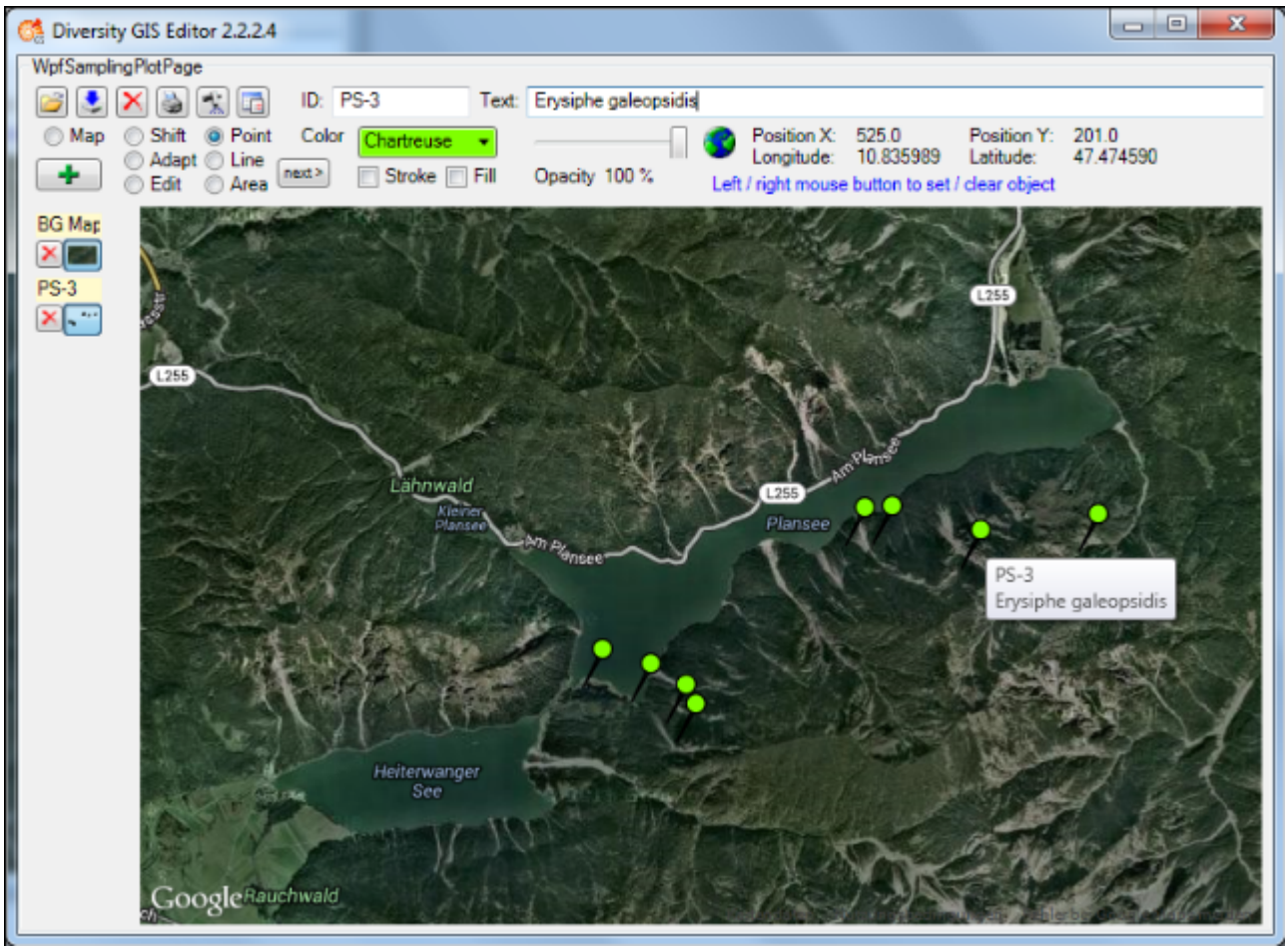
This mode is used to create line strings on the background map. The usage is adequate to the Area Mode. The cursor changes to a cross line when touching the background map. The points of the line strings can be set or cleared by clicking the mouse buttons. Clicking the next > button will switch to the next line string for the sample. The distance of the last drawn line string section is displayed beneath the status area.



Color and transparency can be set for the line strings using the appropriate controls, but only for stroke, because the line strings do not have a filling. Thus checking the Fill box will have no effect. After adding the lines to the sample list a small picture of the first line string will appear on the toggle button.

Chapter 2.5: Point Mode

This mode is used to create Points (object markers) on the background map. The usage is similar to the Area Mode. The cursor changes to a cross line when touching the background map. The object markers can be set by clicking the left mouse button, clicking the right mouse button will clear the last markers one by one again. The next > button has no impact, because each Point represents a complete object and needs not to be finished before creating the next one.



The shape of the object markers can be selected from a number of predefined Point symbols and icons within the Settings window, e.g.:

Pin:	Diamond:	Assel:	Fish:	Mollusc:	Needle:
Cross:	Pyramid:	Bird:	Fungus:	Myxomycete:	
X:	Cone:	Bryophyt:	Insect:	Plant:	
Circle:	Minus:	Echinoderm:	Lichen:	Reptile:	
Square:	Questionmark:	Evertebrate:	Mammal:	Vertebrate:	

Color can be set for the symbol markers using the appropriate controls. It depends on the selected point symbol, whether it just has a stroke (e.g. "Cross") or also a filling (e.g. "Pin"). Transparency can be set for both, the symbol and icon markers. The stroke thickness and the size of the markers can be set in the Settings menu. After adding the object markers to the

sample list a small picture of the collection will appear on the toggle button.

Chapter 2.6: Edit Mode

This mode is used to modify all samples (objects and images) which are currently **visible** on the working area. It applies to the elements of the Sample List as well as to the current sample.

Changing the position or shape of objects (points, line strings, areas)

To change an object one has to move the vertices ("corner points") which are defining it. To do so just move the mouse close to a vertex to localize it. As soon as the corner has been grabbed the cursor changes its shape to a hand symbol .

Now press the left mouse button and hold it, then move the mouse to change the position of the vertex accordingly. The shape of the object or the marker will change in the same manner. Release the mouse button when the preferred position has been set.

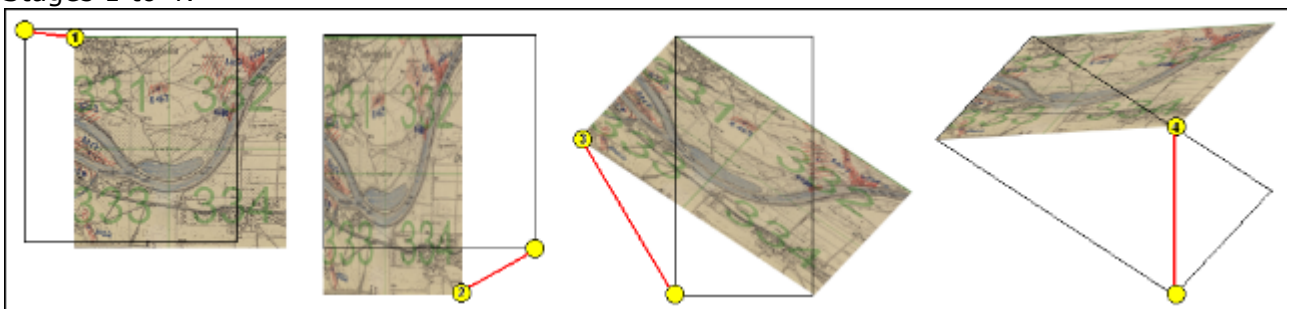
Note that areas and line strings cannot be moved in total while keeping their shapes!

Changing the position or shape of images (maps)

Images (e.g. maps) can be moved completely (keeping their aspect ratio), scaled in horizontal and vertical direction and skewed within an affine transformation. Editing an image can be divided into 4 stages by grabbing and moving the following corners:

1. Top-left: Moving the total image by keeping its aspect ratio
2. Bottom-right: Squeezing or stretching the image horizontally and vertically
3. Bottom-left, top-right: Skewing the image in an affine way by keeping the corner points top-left and bottom-right at its positions
4. Bottom-right again: Skewing the image in an affine way by keeping the corner points top-left and bottom-left at its positions

Stages 1 to 4:



Changing color and transparency

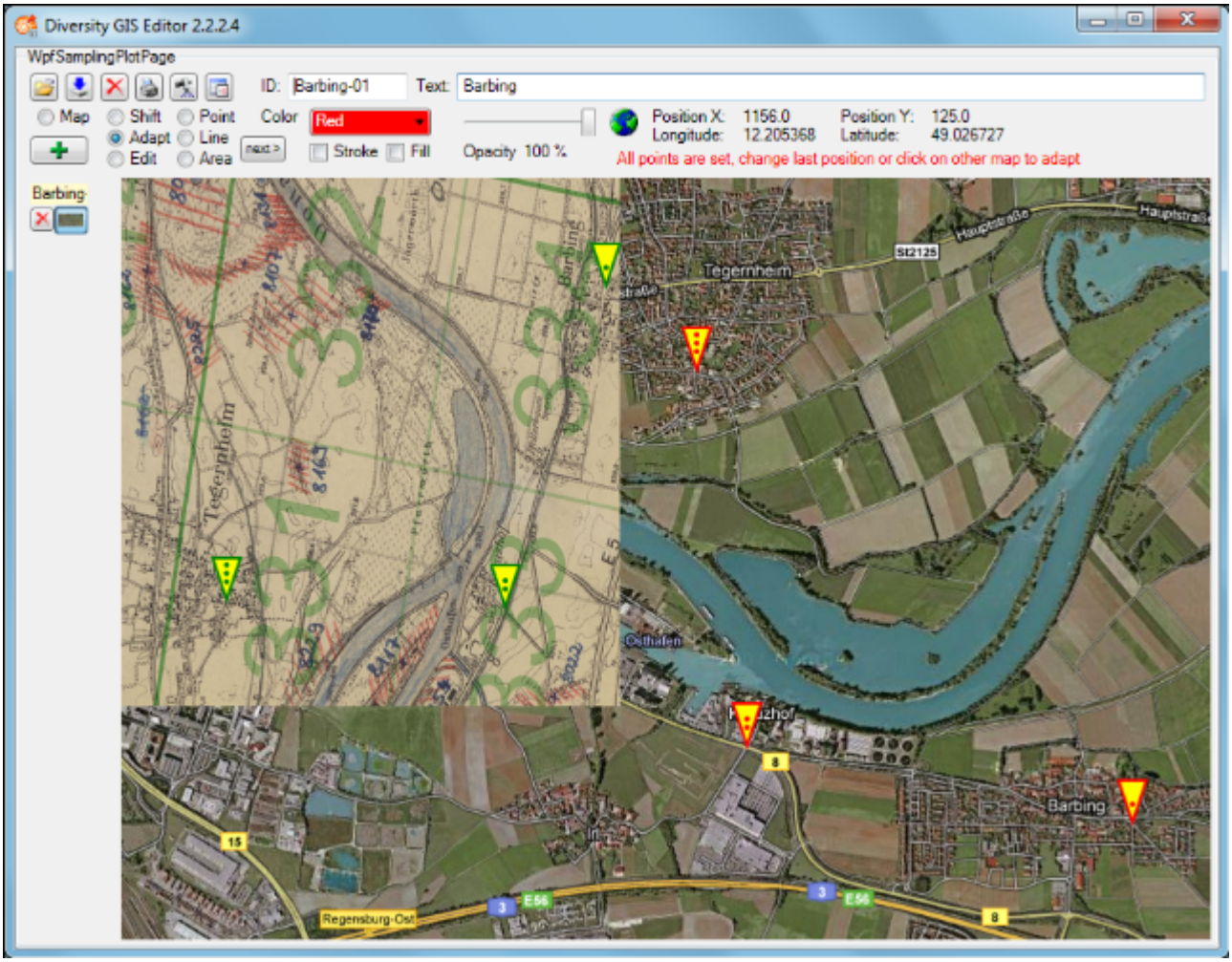
Color and transparency can be set independently (or simultaneously) for the objects using the appropriate controls and check boxes for Stroke or Fill. The setting will affect all visible objects, so objects which should not be changed have to be switched off before with their toggle buttons. The color of images could not be changed, of course, but the transparency can be set if the Fill box is checked. The transparency of the background map cannot be changed.

Chapter 2.7: Adapt Mode

Essential for visualizing Geographical Objects is a background map with world coordinates. The GIS Editor's Map mode offers a convenient way to create such a map, but it is restricted for the use of Google or OSM maps which are present in the web and are providing world coordinates. It would be nice to load scans of e.g. topographical or even historical maps into the working area and use them as background maps, but the problem is how to assign world coordinates to them.

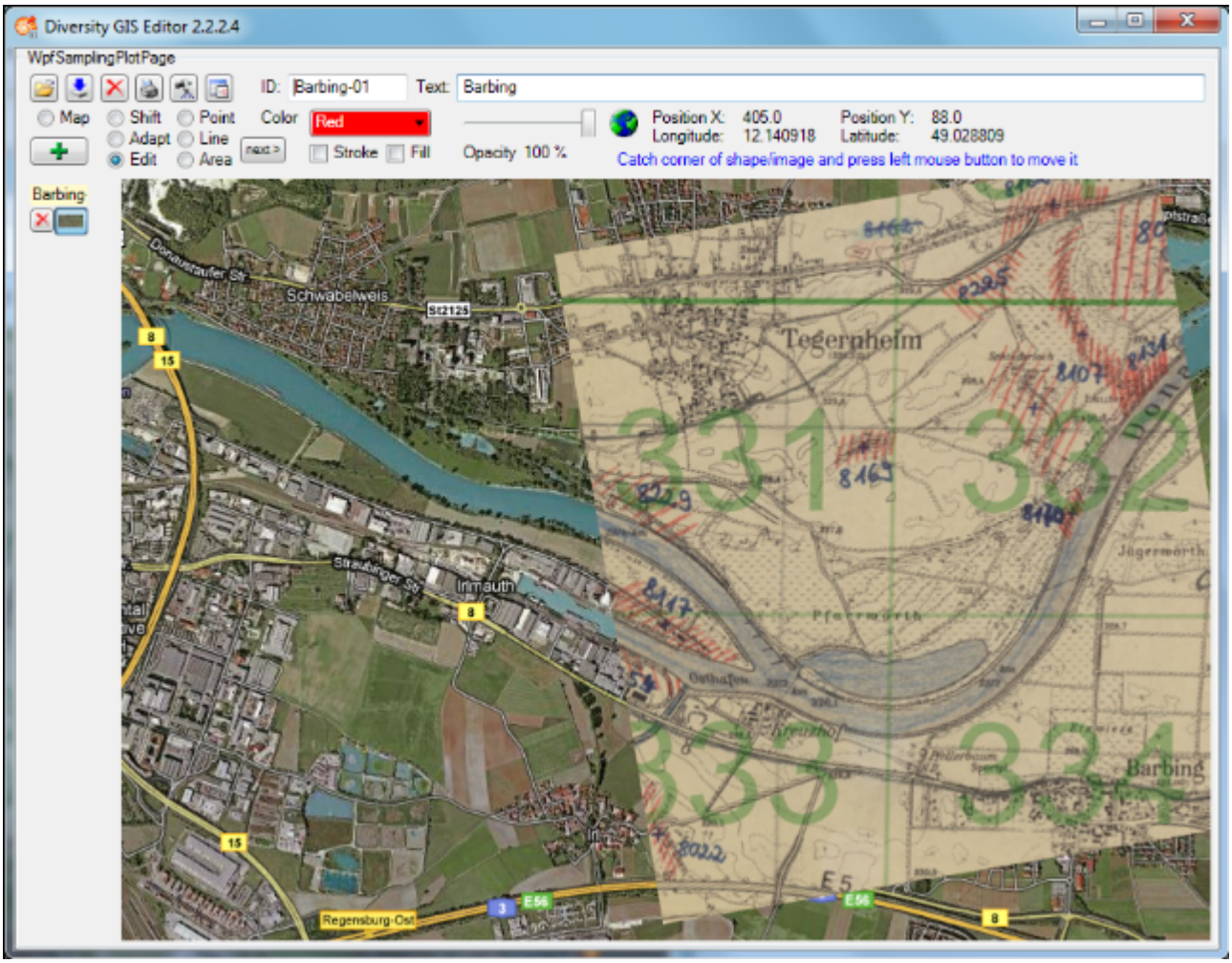
The Adapt mode solves this in an easy way by executing the following steps. As a precondition a background map having world coordinates (e.g. a Google map) must be present which covers the area of interest of the new map to be referenced.

1. Load the new map image using the Load button . The image will be placed top left inside the working area.
2. Select Adapt mode by checking the Adapt radio button. The cursor changes to a pointer symbol having a green border when touching the new image and having a red one when touching the background map.
3. Now 3 reference points must be set alternately on background and new map to assign the appropriate locations (e.g. distinctive landmarks like road crossings). The last point can be modified as long as the map is not changed. The cursor always tells you what reference point will be set, according to its color and the number of dots in the middle:
   Note: It is reasonable to select distant points close to the edges of the new map, because this will give more accurate results.



4. When all reference points have been set and the cursor touches the alternate map, it

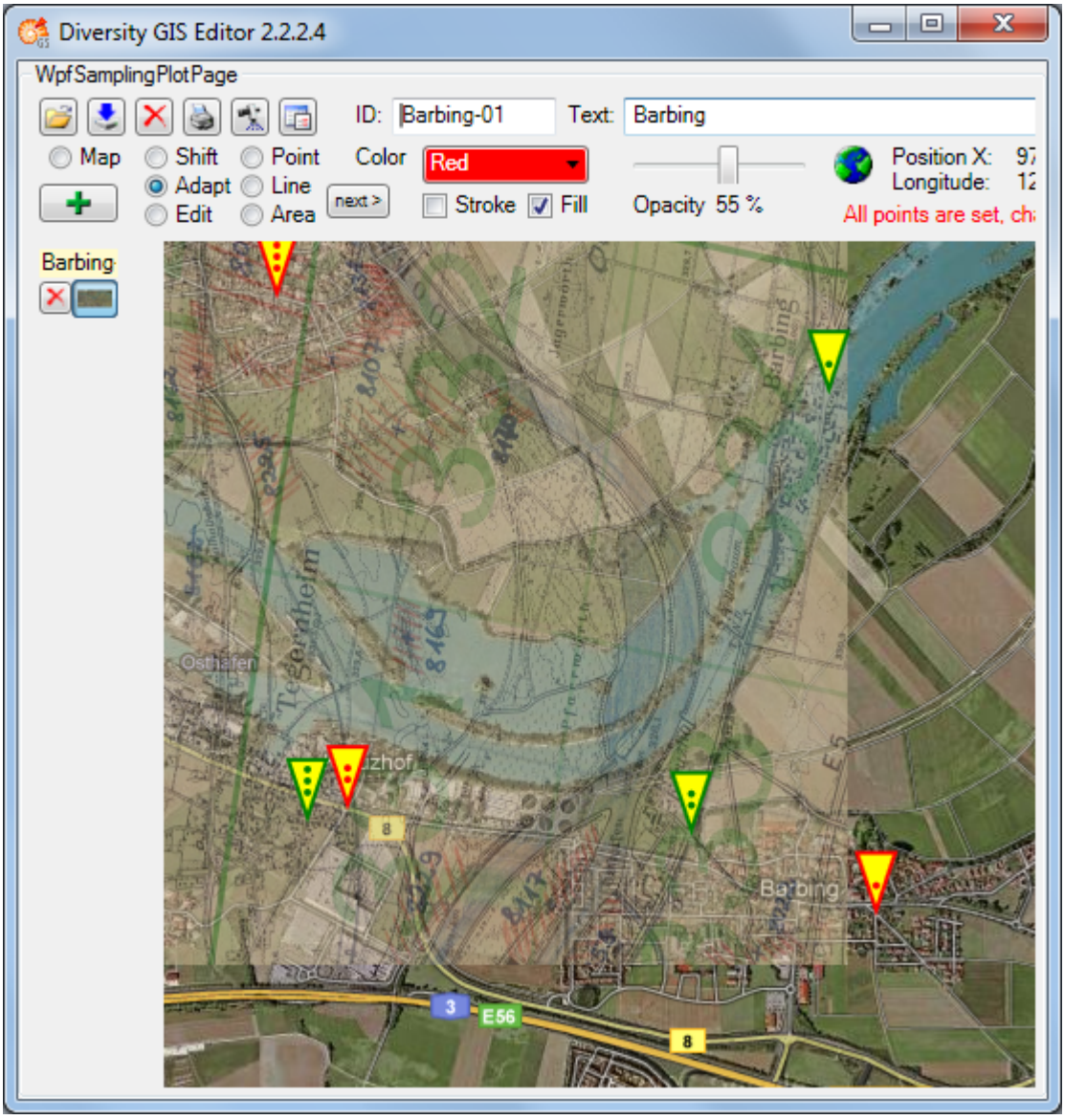
changes to the finished shape  . The next click will place the new map into the appropriate background map area.



The adapted image has been transformed to fit into the current world coordinates of the background map. Now the new map can be added to the sample list by pressing the Add button  . When it is finally saved to disk by pressing the Save button  , the new assigned world coordinates will be saved, too, in an XML file with the same name (see Save Samples).

Sometimes it is difficult to place the new map and the reference map side by side, because the window is too small, and zooming out would blur the details needed for setting the reference points. If the new map covers the background map, the reference points can be set anyway

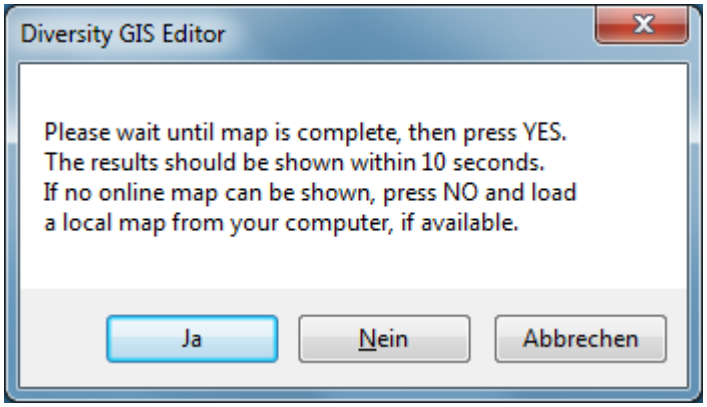
- for the new map by making it opaque with the transparency slider
- for the background map by making the new map transparent (less than 10% opacity) with the slider



Note: The Fill box must be checked to change the transparency of the new map. The background map's transparency cannot be changed.

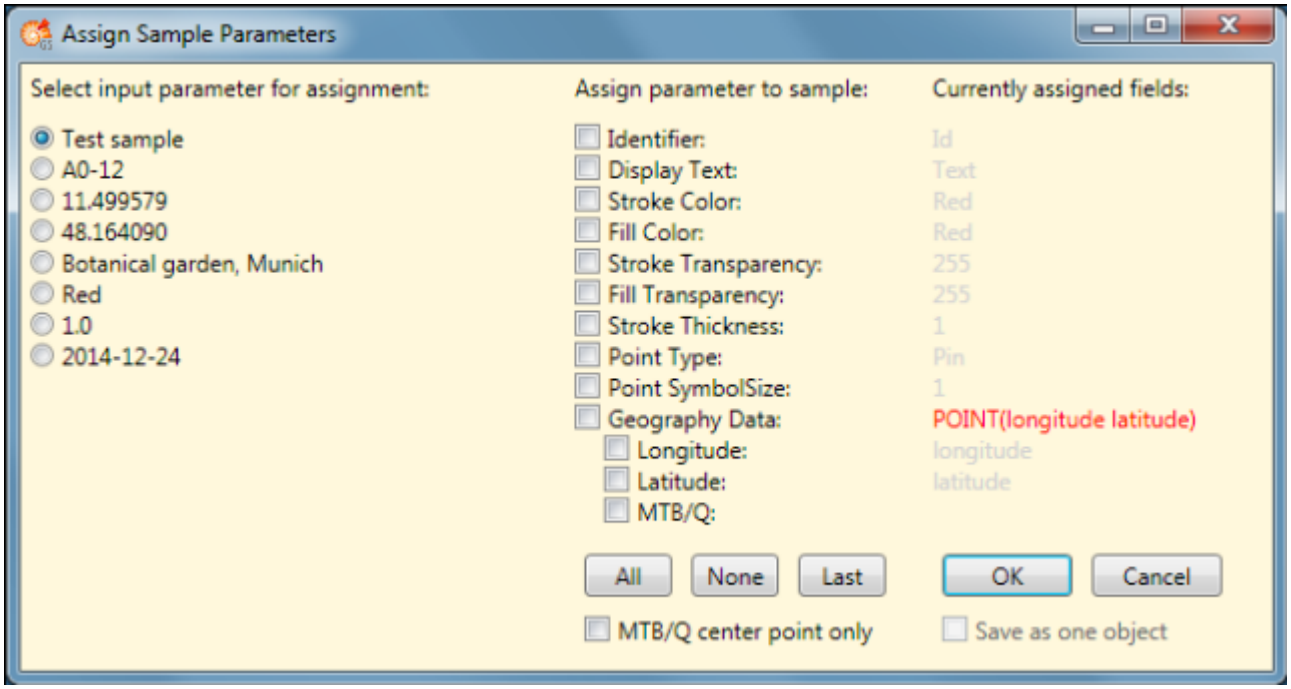
Chapter 2.8: Load Samples

A background map is required before objects (areas, line strings, points) can be loaded. If no background map is available, the GIS Editor will extract the appropriate area from the sample file data and automatically adjust the map viewer to cover the region. The user is prompted to wait until the map has been established completely and then press Ja. If no map is displayed (e.g. because there is no internet connection), the user may press Nein and load a local map instead, or Abbrechen to cancel the loading of the shapes.



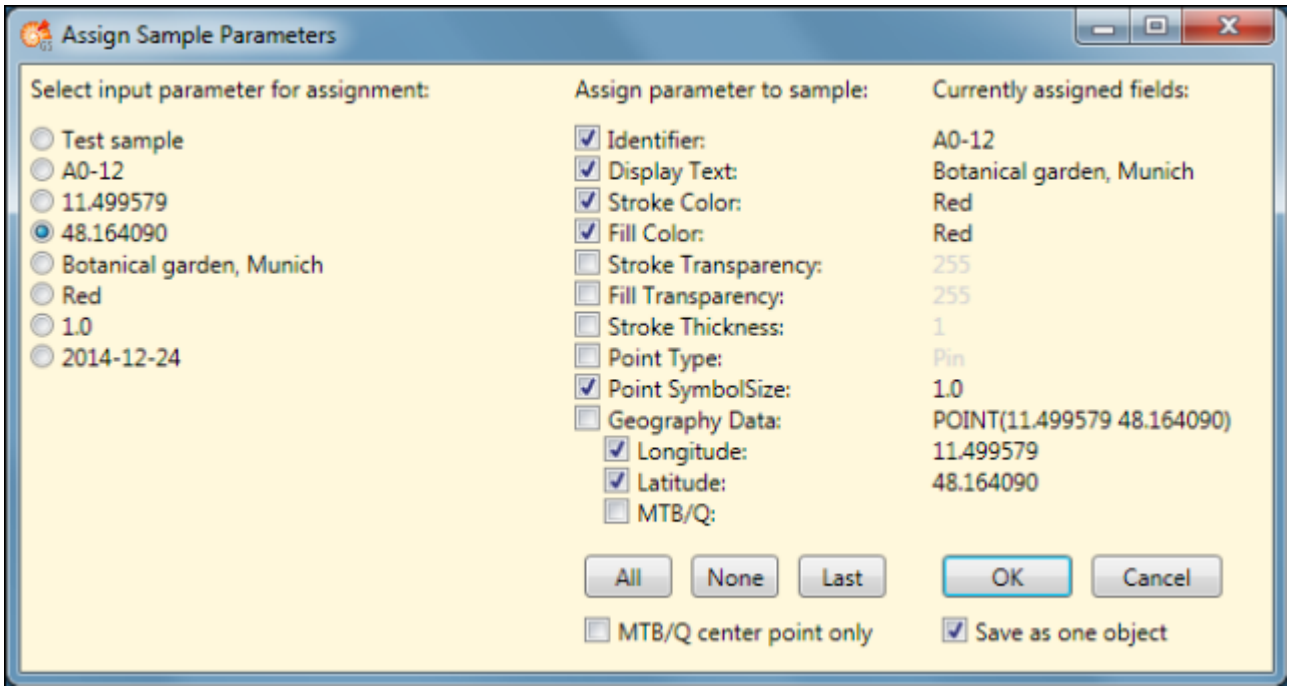
When loading a shape file, the objects will be displayed at the background map according to their coordinates and added to the Sample List automatically. The GIS Editor is able to read MS-SQL Geo Object files (.shp1), TAB separated text files (.shp2), GPS Exchange Format files (.gpx) as well as ArcView Shape Files (.shp).

The assumption of the type of input file is made according to the extension of the file, so e. g. a TAB separated input file of an external source might have to be renamed to .shp2 before it is loaded by the GIS Editor. The input parameters of the first text line are determined, a dialog window will open and show them on the left.



Then you have to assign certain input values to the GIS Editor attributes, wich are displayed in the middle of the window. Select an input parameter using the radio button on the left, then assign it to one or more sample attributes by clicking the appropriate checkbox in the middle. The assigned values are shown on the right side of the window. Values in gray are

default parameters, which are used if the attribute has not been assigned. There is just one mandatory attribute which has to be set, the Geography Data (SQL Geo Object). If there is no SQL Geo Object available in the input file, a point object will be created automatically when assigning longitude and latitude parameters.



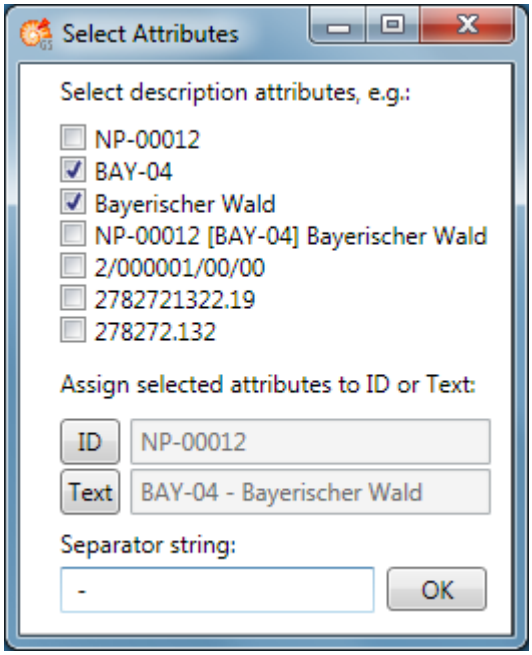
To assign up to 10 input parameters simultaneously to the adjacent 10 sample attributes, just click on the All button. This is helpful if the input file has been created with the GIS Editor itself, so the input values are already in the right order.

To remove all assigned values, click on the None button.

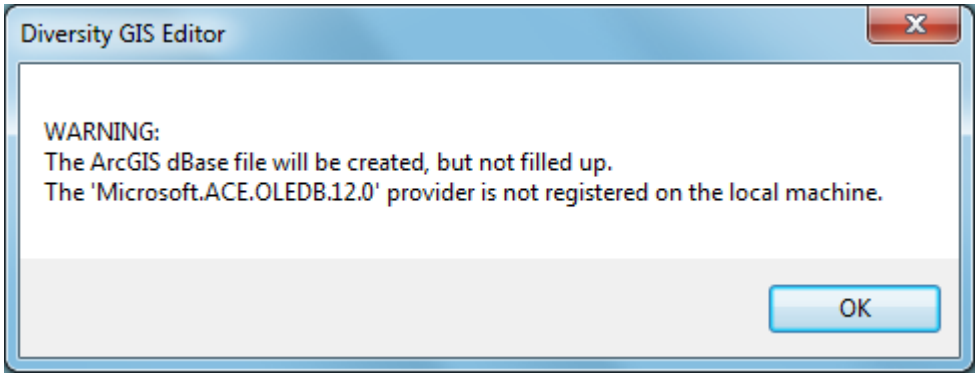
If the assignment is done, click on the OK button to show all geographic objects of the input file according to the assigned parameters. Each object will be added to the list as a separate sample. To put all objects together as one single sample, check the "Save as one object" box.

Click on the Cancel button to cancel the load operation.
The last assignment is saved by the GIS Editor and can be used for the next input file, if it has the same structure as the previous one. Just click on the Last button to assign the same input parameters as before.

The GIS Editor supports ArcView Shape Files (.shp) using geographical, UTM or Gauß-Krüger coordinates. The type of the coordinates (Geographic/Gauß-Krüger or UTM) has to be selected first in the GIS-Editor Settings, in case of UTM also the zone and the hemisphere. If an ArcView attribute file (.dbf) is available, a window will open and show the attributes of the first shape. The user may select the attributes which should be used to create the sample ID and description. Check one or more appropriate boxes and assign them by clicking the "ID" or "Text" button. A separator string may be defined to combine the selected attributes to the final text string. If no attribute is selected, the name of the ArcView file is assigned to the sample description.



To access the dBase attributes file for reading or writing, the Microsoft ACE OLEDB 12.0 driver must be installed on the computer. If it is missing, the attributes cannot be evaluated and a warning will be displayed. The shapes will be loaded properly, anyway, but no description will be added.



When loading an image without world coordinates, it will be displayed top left in the working area. If no background map is loaded yet, the Screen symbol is shown in the status line, followed by the screen coordinates of the current cursor position.

When loading an image with world coordinates and no background reference map exists, it will be displayed top left in the working area. The World symbol is shown in the status line, followed by the screen coordinates and the world coordinates of the current cursor position.

When loading an image with world coordinates having an existing reference map, it will be embedded in the background map according to its coordinates. If the new image does not overlap with the reference map, the image exists virtually in the coordinate system, but possibly could not be seen because it is too far away from the reference map.

Loaded images with world coordinates are immediately added to the Sample List. When loading an image without world coordinates it is displayed, but not yet added to the Sample List. The user has to add it manually by pressing the Add button . This is because the user should have the opportunity to adapt the image to the background map to be stored later on with applicable coordinates.

Chapter 2.9: Save Samples

To save a background map which is currently displayed in Map mode just press the Save button instead of the Add button . A save file dialog will pop up to name the file, the map and its coordinates will be saved and added to the sample list.

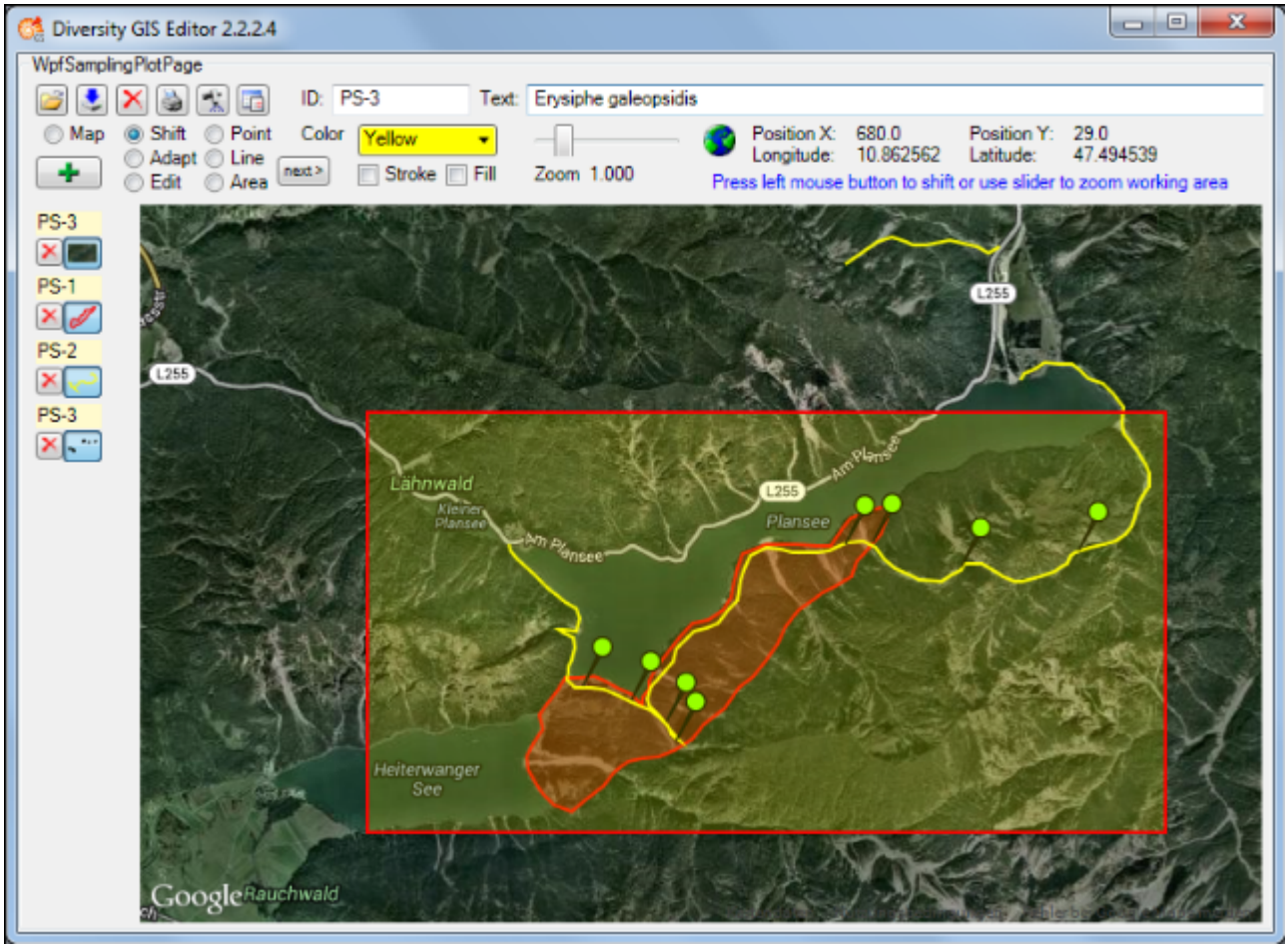
A background map is required before objects and images can be saved. Saving samples means saving their type, attributes and world coordinates in files. When pressing the Save button , it applies to all visible samples on the working area, except the background map. A current sample will be added to the sample list before it is saved.

If objects are visible, a save file dialog will open and a name for the target file(s) must be set. Objects (areas, line strings, points) will be saved in respect to the selected formats of the GIS-Editor Settings:

- If MS-SQL is enabled, all visible objects will be collected and stored in one GIS Editor shape file in text format (extension .shp1). The file contains the objects' attributes and MS-SQL Geo Object definition strings. If altitude calculation is enabled in the GIS-Editor Settings, these values are stored, too.
- If ArcView is enabled, for each object 3 ArcView compatible shape definition files in binary format will be created: A shape file, an index file and a dBase file holding the description (extensions .shp, .shx, .dbf).

If images are in the Sample List, they are already present on disk and will not be saved twice. Instead for each image an XML file will be created with the calculated world coordinates of the image and will be stored under the same location and name as the image. This does not apply to the current background map.

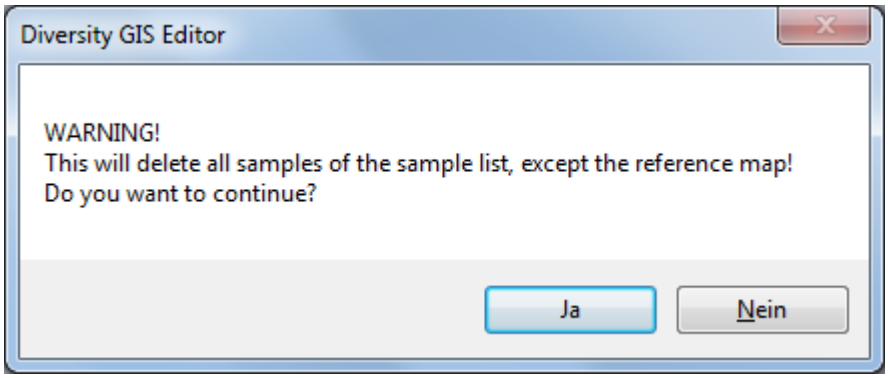
If Save Working Area is enabled in the GIS-Editor Settings, a scan of the complete working area including its objects is made and stored in an image file, which name has been set in the save file dialog.
To save only a part of the working area the Frame box must be checked in the GIS-Editor Settings, too. Then a rectangular frame of the given dimensions is displayed, which defines the part of the working area that will be saved. It can be dragged to the right position using the left mouse button (click, hold and shift), and it can be resized by grabbing and moving the corners of the frame.


Diversity GIS Editor 2.2.2.4
WpfSamplingPlotPage
ID: PS-3
Text: Erysiphe geleopsidis
Map
Shift
Point
Color
Yellow
Adapt
Line
next >
Edit
Area
Stroke
Fill
Zoom 1.000
Position X: 680.0
Longitude: 10.862562
Position Y: 29.0
Latitude: 47.494539
Press left mouse button to shift or use slider to zoom working area
PS-3
PS-1
PS-2
PS-3
L255
Lahnwald
Kleiner Plansee
Am Plansee
Plansee
Heiterwanger See
Rauchwald
Google

Chapter 2.10: Delete Samples

To delete a single object of the Sample List just press the small Delete button left of the Toggle button. The sample will be removed from the list and the working area, the other sample entries will be rearranged.

Pressing the large Delete button in the Control Panel will remove all samples of the Sample List, except the reference map. A warning is shown before:



Chapter 2.11: Print Samples

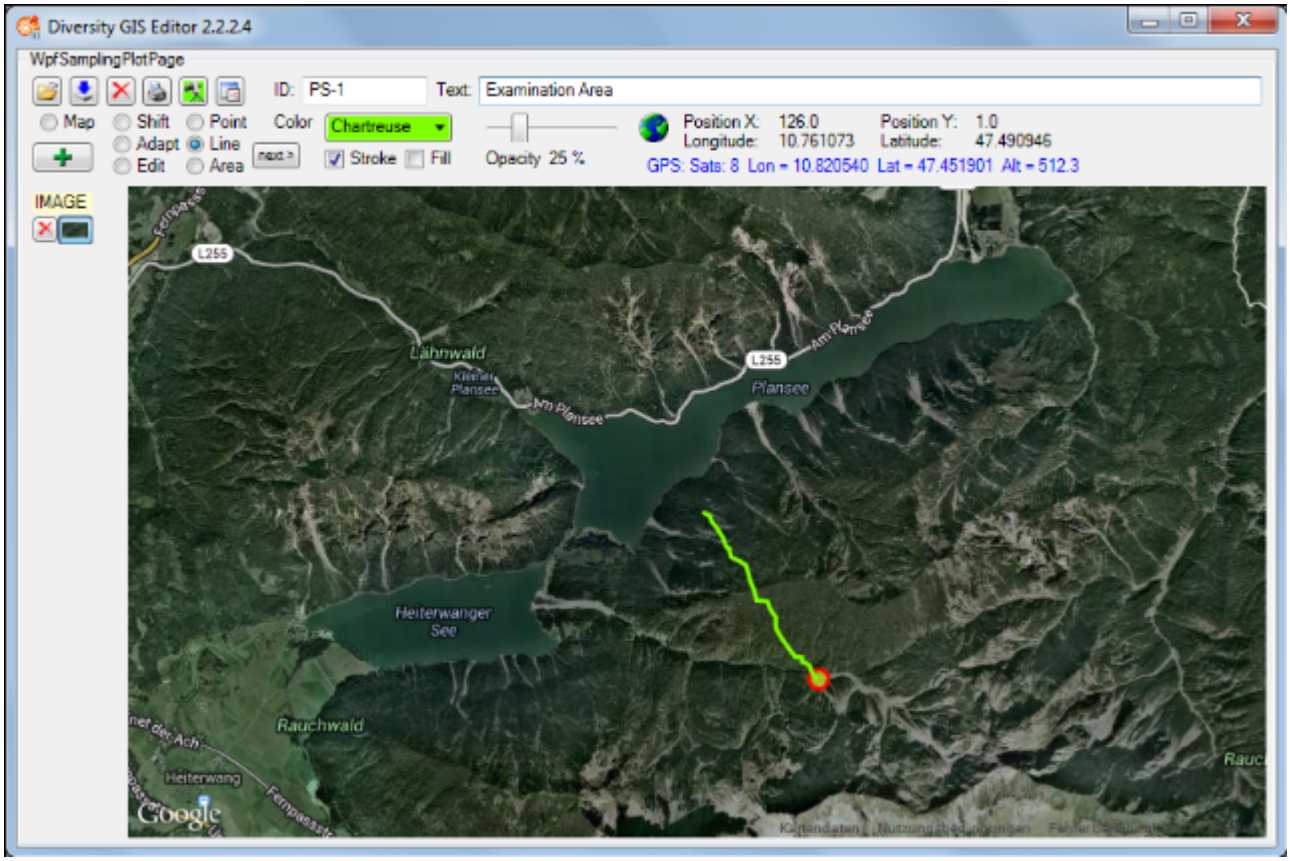
Pressing the Print button  in the Control Panel will open a print dialog to select a printer and adjust the settings. Then it will print the complete working area including all visible objects. This feature is useful e.g. for documentations.

Chapter 2.12: GPS Tracking

When pressing the GPS button in the Control Panel the hardware will be scanned for a GPS device. All available serial ports are opened and checked if they are delivering valid GPS data. This takes 2 seconds. Be sure that the correct baudrate for the GPS device has been set in the Settings menu (standard rate: 9600).

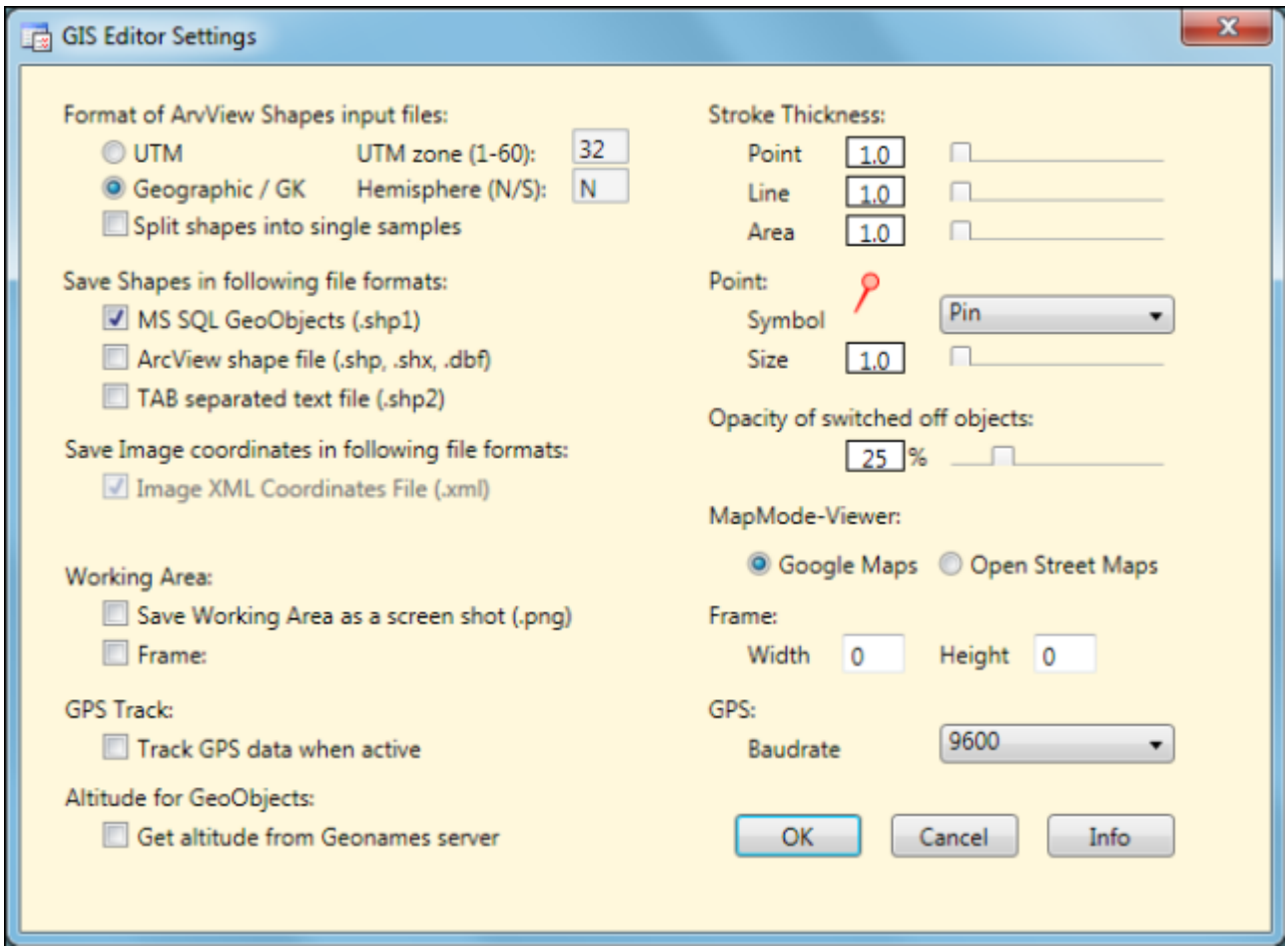
If no device is detected the button will be released. If a device has been found the button changes the color according to the numbers of satellites which have been fixed by the device: Red up to 3 satellites, yellow up to 5 and green if 6 satellites or more are available. The number of satellites, longitude, latitude and altitude delivered from the GPS device are displayed in the info line of the Control Panel beneath the status.

The current position will be shown by a GPS marker if an appropriate background map has been loaded. If GPS Track in the Settings window is checked, the movement of the position will be drawn as a line string on the background map. The color and stroke thickness are similar to the last adjustment for lines. When switching off the GPS button again, the track will be added to the sample list automatically and could be saved for future documentation purposes.



Chapter 2.13: Settings

Pressing the Settings button in the Control Panel will open a dialog to adjust these GIS Editor settings which are not frequently changed:



Setting the file formats for reading ArcView shape files

ArcView is a common Desktop GIS tool and stores its data in binary files. The GIS Editor is able to read these files and display the included geography objects. But because ArcView does not necessarily provide a dedicated information about the GIS format of the contained data, the user has to know and select it in advance.
The GIS Editor currently supports WGS84 geographic coordinates, Gauß-Krüger coordinates (Potsdam datum) und WGS84 UTM coordinates. If "Geographic / GK" is selected, the program will choose the right format by checking the binary values. In case of UTM the user must select the hemisphere (N/S) and the UTM zone (1-60) to ensure that the objects will be displayed at the correct location.

The ArcView data files may contain complex geographic shapes (e.g. polygons or line strings) which are combined by the GIS editor to one multi object (e.g. multipolygon) by default. To split up the shapes into single objects the option "Split shapes into single samples" has to be selected. Then they are placed into the sample list separately. This could be helpful to avoid out-of-memory errors if very large shapes should be converted to SQL geography strings.

Setting the file formats for saving objects

At the moment 3 formats for object files are supported:

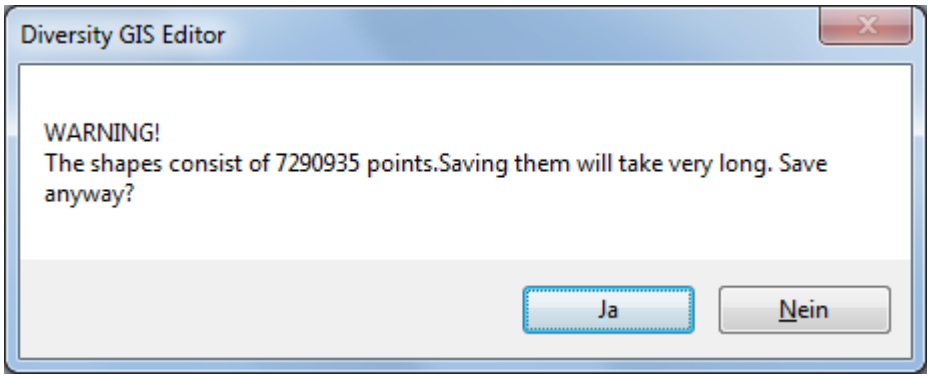
- MS-SQL Geo Objects (.shp1)
- TAB separated text files (.shp2)
- ArcView shape files (.shp, .shx, .dbf)

Microsoft SQL Geo Objects are part of a standard for storing geometry and geography data in an SQL database, as used by the DiversityWorkbench modules. They are a well defined text string containing the geometrical type (e.g. Polygon, Line, Point) and the geographical coordinates (longitude, latitude, optional altitude) of an object.
Together with the GIS Editor attributes (e.g. color, transparency) they are stored in a proprietary GIS Editor shape file in ASCII text format. This file can easily be read and changed using a text editor.

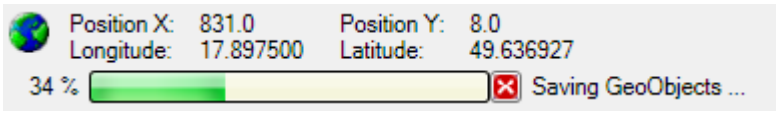
TAB separated text files are widely used as an interchange data file format. The content of a file is more or less the same as above, but the parameters of each object are placed in a single text line, separated by tabulator characters. Additionally to the SQL Geo Object the "envelope center point" (longitude and latitude) of it is saved separately in the file.

The GIS Editor can also create ArcView compatible files to store the samples, which then may be read from ArcView GIS tools. 3 files are required for each type of shape: A data file with extension ".shp", an index file with extension ".shx" and a description file in dBase format with extension ".dbf".

The advantage of the first format is the transparency and readability of the data file, which is just one single text file. But storing huge samples is time consuming, because they have to be converted to SQL geography strings. If the samples consist of more than 100,000 points, an warning message is shown and the user may decide whether to continue or not:



While saving the shapes, a progress bar will be displayed to indicate the status of the task:



Using the ArcView format makes the data files compatible with many applications. Huge samples can be stored much faster. But each type of sample requires a separate set of output files, because different types of objects within one file are not supported so far. So a sample list containing 10 objects will produce 30 data files (file name with an appended index, which is incremented for each sample). Furthermore the attributes like color, transparency and stroke thickness will not be saved.

Currently there is just one format supported for storing image coordinates. They are written into an XML file which is also used in DiversityMobile modules. Saving the coordinates in this format is required for the GIS Editor, so it cannot be disabled.

Saving the working area

Selecting this check box and later on pressing the Save button will additionally scan the working area including all visible objects and save it as an image file under the name provided in the save file dialog, see Save Samples. This is useful for documentations.
Note: There are copyright restrictions on maps or aerial images which are created with the Google maps viewer. Please contact Google before using them for publications to grant a license, or use Open Street Maps captures, which could be used freely under the Creative Commons Attribution Share Alike license conditions.

When checking the "Frame" box just a rectangular part of the working area is saved. The size (in pixels) of the frame has to be defined in the adjacent "Width" and "Height" fields. This is convenient if the resulting image should have well defined dimensions, e.g. fit the resolution of a smartphone display. After closing the Settings window a rectangular frame of these dimensions is displayed on the working area which defines the part to be saved. The frame is only visible in Shift Mode. It can also be adjusted using the mouse: Place the cursor within the frame, press the left mouse button und hold it, then shift the frame by moving the mouse. Or change the size of the frame by grabbing a corner: When the cursor changes, press the left mouse button und hold it, then adjust the size by moving the mouse.

GPS Track

When checking this box the movement of the GPS marker on the background map will be tracked by a line string. After switching off the GPS button the line string will be added to the sample list automatically.

Altitude for geo objects

This box applies to MS-SQL Geo Objects only. If checked, the appropriate altitude of the object points (longitude, latitude) will be stored in the file, too. This is not recommended for sample objects with a lot of points or vertices, because for every point the Geonames server has to be contacted to request the associated altitude value. This could slow down the saving procedure immensely.

Setting the stroke thickness

The stroke thickness for area, line strings and point symbols can be set by using the appropriate slider. The value of the thickness is shown in the label box left of the slider. Double clicking the slider will reset the thickness to its default value 1.

Setting the Point symbol

The symbol for the points can be selected from the drop down menu. The symbol size can be set using the slider below the menu. The point symbol display will change accordingly.

Setting the opacity of switched off objects

The samples on the working area may be switched off and on with the mouse buttons. If the switched off objects would become invisible, it will be difficult to switch them on again, because you don't see them. For this the opacity of the switched off samples can be adjusted between 0% (invisible) and 100% (fully visible) with the slider. E.g. a value of 25% will make the samples transparent, but one can still see and touch them on the map.

Setting the GPS baudrate

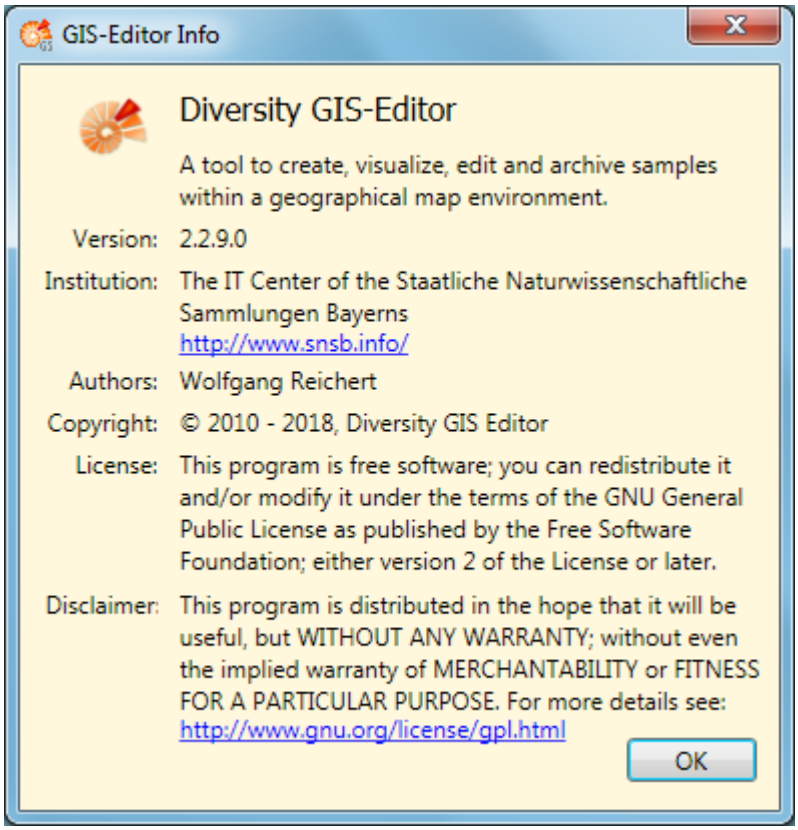
It is essential to set a suitable baudrate for a connected GPS device according to its specification. The rate can be selected from the list of the drop down menu. If no GPS device is available, Demo mode could be chosen to see the behaviour of the functionality.

Setting the Map Mode viewer

The radio buttons offer the choice of the viewer for creating a background map. Currently Google Maps and Open Street Maps are provided.

GIS Editor Info

Clicking the Info button will display a window containing GIS Editor version and license information.

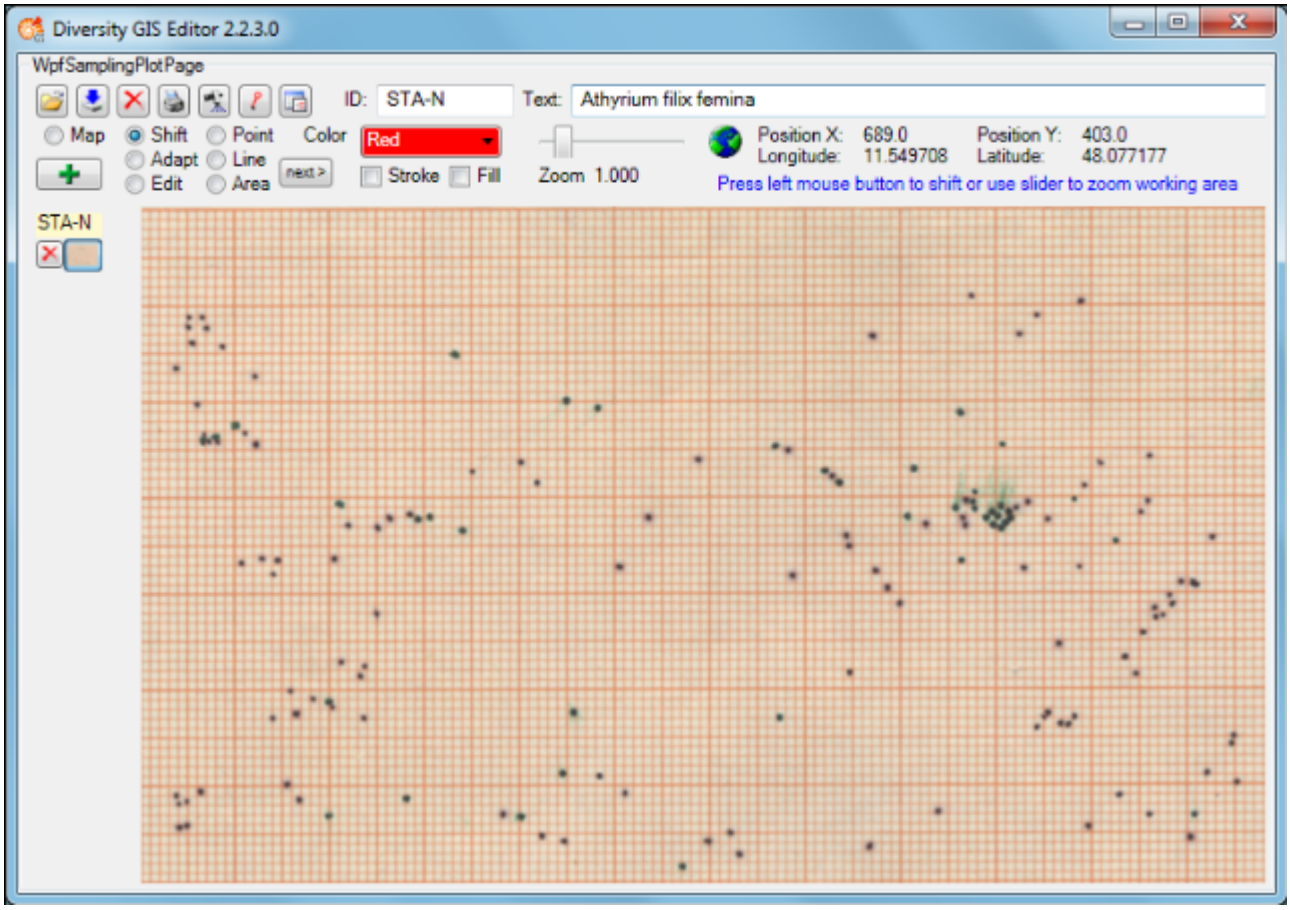


Saving the settings

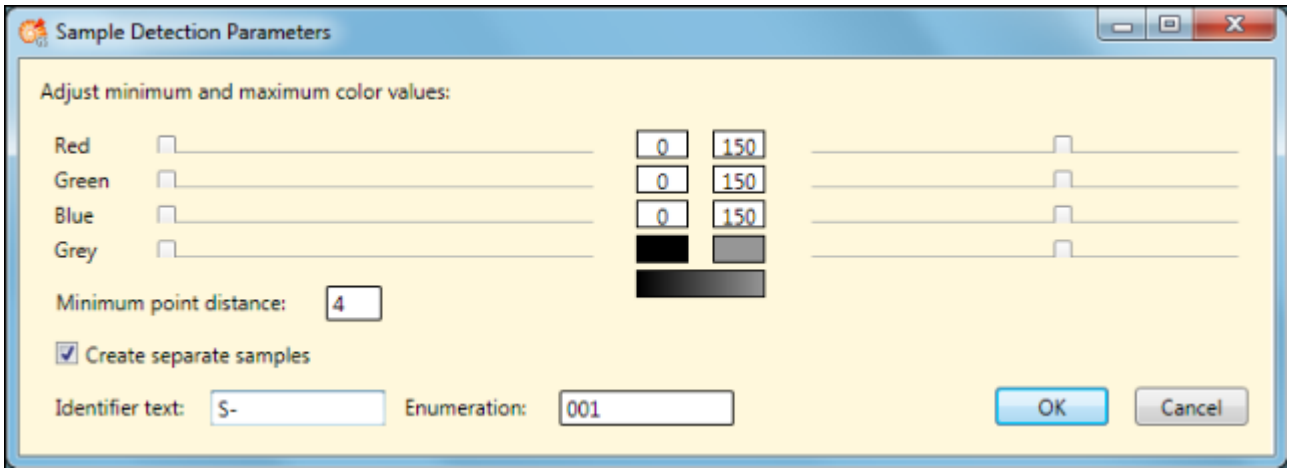
Finally pressing the OK Button will save the settings, pressing the Cancel button will discard them.

Chapter 2.14: Sample Detection

Since GIS Editor version 2.2.3.0 the Sample Detection offers a new convenient tool to digitize sample markers e. g. of a scanned and georeferenced analog paper sheet.



The tool will try to detect "points" on an image according to the detection parameters which can be adjusted in the Sample Detection Parameters window, which will open when clicking the  button.

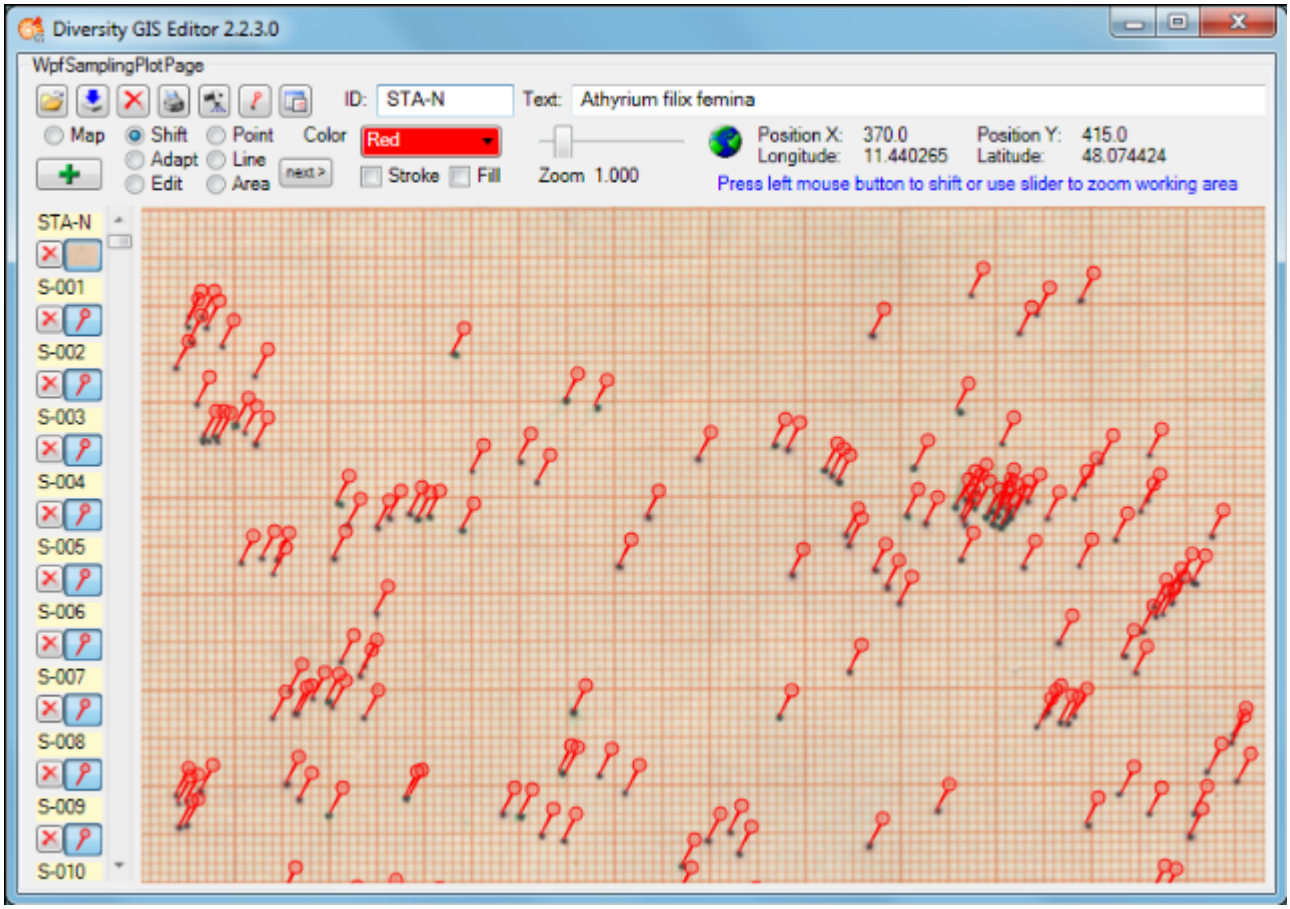


The decision what belongs to a sample and what is just background on the loaded image is made by defining a color range of the object to be found. Looking at the example picture above, we can see that the collector has marked samples using a "black" pen on a reddish scale paper. The points appear as dark grey scatterplots. To detect these points we must define the color range of interest from "mid grey" to "black".

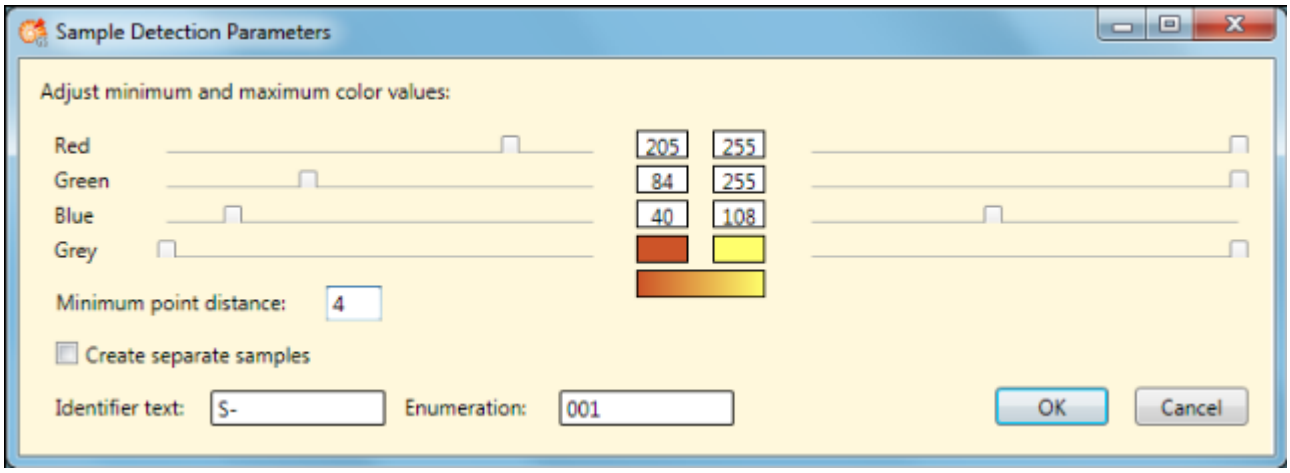
The grey range can be easily set by moving the "Grey" sliders for minimum and maximum values. The sliders for the 3 color channels will move simultaneously, adjusting the channel values in parallel. In the example above we found a range from 0 (black) to 150 (mid grey) which covers the colors of the samples and excludes the background colors. It is visualized in the color boxes for min and max values and as a linear gradient color brush.

If we'd look with a magnifying glass on a single point, we would discover that in fact it is an array of pixels (picture elements) in various shades of grey. To reduce this "cloud" to a single point coordinate the program uses several algorithms. The result can be improved by setting the parameter for the minimum point distance in pixels to an appropriate value (e. g. 4).

The resulting sample points would be displayed as a point collection to be (potentially) edited and added as one sample to the GIS Editor sample list. In contrast, clicking the check box beneath will split up the found sample points into single samples and add them immediately to the sample list including an enumeration. The sample names will then be composed by Identifier and Enumeration (start value, will be incremented) as defined in the text boxes under it. Pressing the OK button will start the detection and deliver the detected points as object markers.



Not only grey points may be detected, but markers of any color tone. The ranges for the red, green and blue color channels can be adjusted individually by moving the sliders for min and max values. The gradient color brush gives you a hint about the resulting color range, but it needs much experience to define a color range properly to get the expected results.


Sample Detection Parameters
Adjust minimum and maximum color values:
Red
Green
Blue
Grey
205
255
84
255
40
108
Minimum point distance:
4
Create separate samples
Identifier text:
S-
Enumeration:
001
OK
Cancel

Chapter 2.15: Selecting Samples

The samples which have been created or loaded may be switched off and on in several ways:

- At the Sample List using the toggle buttons
- At the working area by clicking the objects
- At the working area using the Frame

Switching the toggle buttons of the Sample List with the left mouse button will hide or show the corresponding sample.
Using the right mouse button will effect all samples except the corresponding one and the background map:

- When right clicking on an active toggle button, all other samples will be switched off.
- When right clicking on an inactive toggle button, all other samples will be switched on.

Since version 2.2.9.0 the samples may also be switched directly on the working area in a similar way:

- Left click on a visible/invisible sample will hide/show the sample.
- Right click on a visible sample will switch off all other samples.
- Right click on a invisible sample will switch on all other samples.

To be able to locate the 'invisible' switched off samples on the working area (e.g. to switch them on again) the opacity of them can be set in the GIS-Editor Settings. 100% means fully visible, 0% means invisible.
Note: The opacity has to be set **before** the samples are loaded or created! The value is part of the corresponding object and cannot be changed afterwards.

If there is a big amount of samples loaded to the working area it might be desirable to make a preselection before switching them one by one. For this select Shift mode and enable the Frame in the GIS-Editor Settings. Adjust the position and size of the Frame, then click on the Frame area with the right mouse button to switch on all samples within the frame and switch off all samples outside.