**Xcell**

Database model documentation

Created with Vertabelo.com

# 1. Model details

**Model name:** 
Xcell

**Version:** 
2.3

**Database engine:** 
PostgreSQL

# 2. Tables

## 2.1. Table site

**Description:** 
This table will contain information about the site

2.1.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the site |
| sampling\_year | int |  | Year of wood sampling on the site. This date should not be null and is important to be sure that there are no doubles data in the database in case of repeated sampling |
| country\_code | varchar(2) |  | A two character code to identify the country, e.g. CH = Switzerland |
| site\_code | varchar(5) |  | A 3-5 character code to identify the site, e.g. LOT = Loetchental |
| site\_label | varchar(64) |  | Label assigned to the site |
| target\_proxy | varchar(20) |  | Target main proxy to measured. To be chosen among - cell anatomy - density (X-ray) - density (blue light) - silviscan - multiple proxies - |
| longitude | decimal(10,7) |  | coordinated in the WGS84 system in decimal degrees: 23.9341496668542. Use only this coordinate system. |
| latitude | decimal(10,7) |  | coordinated in the WGS84 system in decimal degrees: 23.9341496668542. Use only this coordinate system. |
| elevation | int |  | elevation of site location [m a.s.l] |
| aspect | int |  | aspect, slope orrientation of the plot (360° system, integer). |
| slope | int |  | slope steepness at the site, in degrees (integer). |
| soil\_depth | varchar(20) |  |  |
| soil\_water\_capacity | varchar(20) |  |  |
| species\_composition | varchar(20) |  |  |
| management | varchar(20) |  |  |
| data\_location | text | null |  |
| image\_location | text | null |  |
| sample\_location | text | null |  |

2.1.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| site\_ak\_1 | sampling\_year, country\_code, site\_code, target\_proxy |  |

2.1.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| site\_idx\_1 | id (ASC), sampling\_year (ASC), country\_code (ASC), site\_code (ASC), target\_proxy (ASC) |  |

## 2.2. Table person

**Description:** 
This table will contain information about the person

2.2.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the person |
| last\_name | varchar(64) |  | person Last name |
| first\_name | varchar(64) |  | person First name |
| email | varchar(64) |  | person e-mail |
| institution\_code | varchar(5) |  | A 5 character Institution Code |
| webpage | varchar(128) | null |  |
| phone\_number | varchar(64) | null |  |

2.2.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| person\_ak\_1 | last\_name, first\_name, institution\_code |  |

2.2.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| person\_idx\_1 | id (ASC), last\_name (ASC), first\_name (ASC), institution\_code (ASC) |  |

## 2.3. Table tree

**Description:** 
This table will contain information about the tree

2.3.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the tree |
| site\_id | int |  | A unique identification for the site |
| tree\_label | varchar(64) |  | Label assigned to the tree |
| species\_code | varchar(4) |  | A four character code to identify the species, e.g. LADE = Larix decidua |
| status\_code | varchar(4) |  | indicate if the tree is dominant (DOM), codominant (cDOM), suppressed (SUPP), dying (DYING), dead (DEAD), or from old dead material (LOG) or sub fossil (SUBF) |
| dbh | decimal(6,2) | null | Tree stem diameter at breast height [cm] |
| height | decimal(4,2) | null | tree height [m] |
| age | int | null | age of the tree [years] |

2.3.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| tree\_ak\_1 | site\_id, tree\_label, species\_code |  |

2.3.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| tree\_idx\_1 | id (ASC), site\_id (ASC), tree\_label (ASC), species\_code (ASC) |  |

## 2.4. Table species\_fk

**Description:** 
This table contain a list of species code

2.4.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| species\_code | varchar(4) | PK | A unique identification for the species |
| species | varchar(64) |  | A four character code to identify the species, e.g. LADE = Larix decidua |

## 2.5. Table country\_fk

**Description:** 
This table contain a list of contries code

2.5.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| country\_code | varchar(2) | PK | A unique identification for the country |
| country | varchar(64) |  | A two character code to identify the country, e.g. CH = Switzerland |

## 2.6. Table wood\_sample

**Description:** 
This table will contain information about the wood sample

2.6.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the wood sample |
| tree\_id | int |  | A unique identification for the tree |
| sample\_label | varchar(64) |  | Label assigned to the wood sample |
| sample\_type | varchar(20) |  |  |
| radius | varchar(2) |  | Identifier of the stem radius (in case of measurements along multiple radii); e.g. A, B, C |
| organ | varchar(2) |  | Indicate if stem (S), branch (B) or root (R) |
| cell\_type | varchar(2) |  | Category of cell type T = Tracheas V = Vessel P = Parenchyma F = Fiber B = band integration |
| stem\_height | decimal(6,2) | null | height of sample collection [m] |
| apex\_dist | decimal(6,2) | null | distance of sample collection from tree/branch apex [cm] |

2.6.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| wood\_sample\_ak\_1 | tree\_id, sample\_label, radius, organ, cell\_type |  |

2.6.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| wood\_sample\_idx\_1 | id (ASC), tree\_id (ASC), sample\_label (ASC), radius (ASC), organ (ASC), sample\_type (ASC) |  |

## 2.7. Table ring

**Description:** 
This table will contain information about the annual ring

2.7.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the annual ring |
| subpiece\_id | int |  |  |
| year | decimal(4,0) |  | Calendar year of annual ring formation (e.g. 1990) |
| ring\_width | decimal(8,2) |  | radial with of the earlywood [micron] |
| ring\_area | decimal(10,2) | null | RA - Ring area [mm2], in tree cores without extrapolation to sector limits (-> net area), in circular samples with extrapolation to sector limits, even if outside of image [Roxas] |
| eww | decimal(6,2) | null | [micron] |
| lww | decimal(6,2) | null | radial with of the latewood [mm] |
| ewd | decimal(6,2) | null | average density of the earlywood [UNIT?] |
| lwd | decimal(6,2) | null | average density of the latewood [UNIT?] |
| mxd | decimal(6,2) | null | maximum latewood density [UNIT?] |
| mnd | decimal(6,2) | null | minimum earlywood density [UNIT?] |
| rvgi | decimal(6,2) | null | RVGI - Vessel Grouping Index per annual rings: Mean number of cells per group (solitary cells are also considered as a group; vgl. Carlquist 2001); Error codes: -9999 - grouping analysis not performed (NA or double cell wall thickness set to 0); -999 - user aborted this analysis; -99 - ROXAS aborted this analysis during batch processing [Roxas] |
| rvsf | decimal(6,2) | null | RVSF - Vessel Solitary Fraction per annual rings: Fraction of solitary cells with respect to all cells [%]; Error codes: -9999 - grouping analysis not performed (NA or double cell wall thickness set to 0); -999 - user aborted this analysis; -99 - ROXAS aborted this analysis during batch processing [Roxas] |
| rgsgv | decimal(6,2) | null | RGSGV - Mean group size of grouped / non-solitary cells per annual rings; Error codes: -9999 - grouping analysis not performed (NA or double cell wall thickness set to 0); -999 - user aborted this analysis; -99 - ROXAS aborted this analysis during batch processing [Roxas] |

2.7.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| ring\_ak\_1 | subpiece\_id, year |  |

2.7.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| ring\_idx\_1 | id (ASC), subpiece\_id (ASC), year (ASC) |  |

## 2.8. Table profile

**Description:** 
This table will contain information/data of tree-ring (profile) data as obtained from Silviscan or Walesch systems

2.8.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the cell (in this case it refers to the band-width integration measurements along the ring growth axis). |
| ring\_id | int |  | A unique identification for the annual ring |
| dist | int |  | RadDistR - Radial distance of the measured band from the inner ring boundary [microns] [Roxas] |
| drad | decimal(6,2) | null | Drad - Radial cell lumen diameter (measured radially (vertically) in linear samples and towards the pith in circular samples) [microns] [Roxas] |
| dtan | decimal(6,2) | null | Dtan - Tangential cell lumen diameter (measured HORIZONTALLY in linear and perpendicular to radial rays in circular samples) [microns] [Roxas] |
| ldrad | decimal(6,2) | null |  |
| ldtan | decimal(6,2) | null |  |
| cwtrad | decimal(6,2) | null |  |
| cwttan | decimal(6,2) | null |  |
| lum | decimal(10,4) | null |  |
| cwa | decimal(10,4) | null |  |
| density | decimal(10,4) | null |  |

2.8.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| profile\_ak\_1 | ring\_id, dist |  |

2.8.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| profile\_idx\_1 | id (ASC), ring\_id (ASC), dist (ASC) |  |

## 2.9. Table publication

**Description:** 
list of publication from the site

2.9.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the publication |
| site\_id | int |  | A unique identification for the site |
| reference | text |  | Reference of the publication |

2.9.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| publication\_ak\_1 | site\_id, reference |  |

## 2.10. Table person\_role

**Description:** 
This table will contain information about the person role

2.10.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK |  |
| site\_id | int |  |  |
| person\_id | int |  |  |
| role | int |  | A unique identification for the person role |

2.10.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| person\_role\_ak\_1 | site\_id, person\_id, role |  |

## 2.11. Table clima

**Description:** 
This table will contain information about the climate at the sites

2.11.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK |  |
| site\_id | int |  | A unique identification for the site |
| param | varchar(10) |  | source for the climatic data, e.g Temp, Precip, SPEI1, ... |
| year | decimal(4,0) |  |  |
| month | decimal(2,0) |  |  |
| value | decimal(6,2) |  | long-term mean annual temperature from grid-data |
| source | varchar(20) |  | Source of climatic data, e.g.. CRU.ts3 |

2.11.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| clima\_ak\_1 | site\_id, param, year, month, source |  |

## 2.12. Table institution\_fk

**Description:** 
This table contain information about the institution

2.12.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| institution\_code | varchar(5) | PK | A 5 character Institution Code |
| institution\_name | varchar(64) |  | Full name of the institution |
| country\_code | varchar(2) |  | A two character code to identify the country, e.g. CH = Switzerland |
| department | varchar(64) | null |  |
| street | varchar(64) |  | Street address |
| postal\_code | varchar(64) | null | Postal code |
| city | varchar(64) |  | City |

## 2.13. Table comments

**Description:** 
A place for remarks relative to the site or the data set

2.13.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK |  |
| site\_id | int |  |  |
| person\_id | int |  | A unique identification of the person making the comment |
| text | text |  | Comment |

2.13.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| comments\_ak\_1 | site\_id, person\_id |  |

## 2.14. Table role\_fk

**Description:** 
This table contain a list of person role code

2.14.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the site |
| description | varchar(64) |  | 1 - owner 2 - contact 3 - both |

## 2.15. Table status\_fk

**Description:** 
This table contain a list of status code (in leaving or dead form)

2.15.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| status\_code | varchar(4) | PK | A unique identification for the social status |
| description | varchar(64) |  | indicate if the tree is dominant (DOM), codominant (cDOM), suppressed (SUPP), dying (DYING), dead (DEAD), or from old dead material (LOG) or sub fossil (SUBF) |

## 2.16. Table organ\_fk

**Description:** 
This table contain a list of sample types

2.16.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| organ | varchar(2) | PK | A unique identification for the sample type |
| description | varchar(64) |  | Indicate if stem (S), branch (B) or root (R) |

## 2.17. Table cell\_type\_fk

**Description:** 
This table contain a list of cell types

2.17.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| cell\_type | varchar(2) | PK | A unique identification for the cell type |
| description | varchar(64) |  | Category of cell type T = Tracheid V = Vessel P = Parenchyma F = Fiber B = Band integration |

## 2.18. Table tracheid\_row

**Description:** 
This table will contain information/data about Tracheid data (cell measurements from softwood species) for measurement that performed along selected radial files (for tracheidogram) as for measured with Axiovision or ImageJ

2.18.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the Tracheid |
| ring\_id | int |  | A unique identification for the annual ring |
| row | int |  | Number of the radial file the tracheas belongs to |
| position | int |  | Ordered cell position within the radial file (in order of production) |
| ldrad | decimal(6,2) |  | Radial lumen diameter [micron] |
| double\_cwtrad | decimal(6,2) | null | Radial double cell wall thickness [micron] |
| lum | decimal(10,4) | null |  |

2.18.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| tracheid\_row\_ak\_1 | ring\_id, row, position |  |

2.18.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| tracheid\_row\_idx\_1 | id (ASC), ring\_id (ASC), row (ASC), position (ASC) |  |

## 2.19. Table tracheid\_full

**Description:** 
This table will contain information/data about Tracheid data (cell measurements from softwood species) for measurement that performed for all tracheids in a given ring sector as measured with Roxas or WinCell

2.19.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the Tracheid |
| ring\_id | int |  | A unique identification for the annual ring |
| x\_cal | decimal(10,4) |  | Xcal - X-value of cell in calibrated coordinate system [microns] [Roxas] |
| y\_cal | decimal(10,4) |  | Ycal - Y-value of cell in calibrated coordinate system [microns] [Roxas] |
| asp | decimal(6,2) | null | Asp - Aspect of cell: Ratio between major and minor axis of an ellipse equivalent to the tracheid lumen |
| majax | decimal(6,2) | null | MajAx - Absolute angular deviation of major cell axis from a line towards the pith [°] [Roxas] |
| dist | decimal(8,2) | null | RadDistR - Radial distance from the tracheid to the inner ring boundary [microns] [Roxas] |
| rel\_dist | decimal(6,2) | null | RRadDistR - Relative Radial distance from the tracheas the the inner ring boundary [microns] [%]. 0.00 - at proximal boundary; 99.99 - at distal boundary; Error code: -99999 - within outmost, not delimited ring [Roxas] |
| drad | decimal(6,2) | null | Drad - Radial cell lumen diameter (measured radially (vertically) in linear samples and towards the pith in circular samples) [microns] [Roxas] |
| dtan | decimal(6,2) | null | Dtan - Tangential cell lumen diameter (measured HORIZONTALLY in linear and perpendicular to radial rays in circular samples) [microns] [Roxas] |
| ldrad | decimal(6,2) | null | Radial lumen diameter [micron] |
| ldtan | decimal(6,2) | null | Tangential lumen diameter [micron] |
| cwtpi | decimal(6,2) | null | CWTpi - Overall mean thickness of inner cell wall (facing the pith) [microns]; Error code: -999 - wall thickness could not be calculated [Roxas] |
| cwtba | decimal(6,2) | null | CWTba - Overall mean thickness of outer cell wall (facing the bark) [microns]; Error code: -999 - wall thickness could not be calculated [Roxas] |
| cwtle | decimal(6,2) | null | CWTle - Overall mean thickness of left cell wall (viewed from pith) [microns]; ATTENTION: often includes artefact from pit-pore associated widening! Error code: -999 - wall thickness could not be calculated [micron] [Roxas] |
| cwtri | decimal(6,2) | null | CWTri - Overall mean thickness of right cell wall (viewed from pith) [microns]; ATTENTION: often includes artefact from pit-pore associated widening! Error code: -999 - wall thickness could not be calculated [micron] [Roxas] |
| cwttan | decimal(6,2) | null | CWTtan - Overall mean thickness of radial cell walls ([CWTpi+CWTba]/2) [microns]; Error code: -999 - wall thickness could not be calculated [micron] [INVERTED Roxas] |
| cwtrad | decimal(6,2) | null | CWTrad - Overall mean thickness of radial cell walls ([CWTle+CWTri]/2) [microns]; ATTENTION: often includes artefact from pit-pore associated widening! Error code: -999 - wall thickness could not be calculated [micron] [INVERTED Roxas] |
| lum | decimal(10,4) | null | Tracheid lumen area CA - Cell size [microns2] [Roxas] |
| cwa | decimal(10,4) | null | Cell wall area [micron2] |
| bend | decimal(10,4) | null | Bend - Overall mean bending resistance index (t/b)2. t is the double cell wall thickness and b the length of the same cell wall; the smaller of the radial or tangential values is selected; Error code: -999 - no value calculated because one of the factors was missing. Hacke, U.G., Sperry, J.S., Pockman, W.T., Davis, S.D., and Mcculloh, K.A. (2001). Trends in wood density and structure are linked to prevention of xylem implosion by negative pressure. Oecologia 126, 457-461 [Roxas} |

2.19.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| tracheid\_full\_ak\_1 | ring\_id, x\_cal, y\_cal |  |

2.19.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| tracheid\_full\_idx\_1 | id (ASC), ring\_id (ASC) |  |

## 2.20. Table vessel

**Description:** 
This table will contain information/data about vessel data (cell measurements from hardwood species) as measured with Roxas or WinCell

2.20.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the vessel |
| ring\_id | int |  | A unique identification for the annual ring |
| x\_cal | decimal(10,4) |  | Xcal - X-value of cell in calibrated coordinate system [microns] [Roxas] |
| y\_cal | decimal(10,4) |  | Ycal - Y-value of cell in calibrated coordinate system [microns] [Roxas] |
| asp | decimal(6,2) | null | Asp - Aspect of cell: Ratio between major and minor axis of an ellipse equivalent to the vessel lumen |
| majax | decimal(6,2) | null | MajAx - Absolute angular deviation of major cell axis from a line towards the pith [°] [Roxas] |
| nbrno | decimal(6,2) | null | NbrNo - Number of cells in the group the cell belongs to [Roxas] |
| nbrdst | decimal(6,2) | null | NbrDst - Euclidean distance between cell lumina outlines of all cells belonging to the same group as target cell (remains blank of target cell is solitary); assuming that major cell axis are facing each other in a straight line [Roxas] |
| dist | decimal(8,2) | null | RadDistR - Radial distance from the vessel the inner ring boundary [microns] [Roxas] |
| rel\_dist | decimal(6,2) | null | RRadDistR - Relative Radial distance from the vessel the the inner ring boundary [microns] [%]. 0.00 - at proximal boundary; 99.99 - at distal boundary; Error code: -99999 - within outmost, not delimited ring [Roxas] |
| lum | decimal(10,4) | null | Vessel lumen area CA - Cell size [microns2] [Roxas] |

2.20.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| vessel\_ak\_1 | ring\_id, x\_cal, y\_cal |  |

2.20.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| vessel\_idx\_1 | id (ASC), ring\_id (ASC), x\_cal (ASC), y\_cal (ASC) |  |

## 2.21. Table measure\_info

**Description:** 
This table will contain information about the climate at the sites

2.21.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification of the measurement |
| sample\_id | int |  | A unique identification for the wood sample |
| subpiece\_label | varchar(64) |  |  |
| system | varchar(10) |  | Indicate the measuring system (the process used to collect the data), e.g Image analysis from scanner (Im\_scanner) from light microscopy (Im\_micro), confocal microscope (Im\_confo), slide-scanner (Im\_sidescan), (X\_ray), Silviscan (Silvi) |
| software | varchar(10) |  | Name of the measuring software, e.g ImageJ, Roxas, WinCell, Walesch, .. |
| software\_version | varchar(10) | null | software version |
| magnification | int | null | magnification applied for image capturing |
| image\_size | decimal(6,2) | null | tangential length of the annual rings measured [mm] |
| calibration | decimal(12,9) | null | calibration applied to transform pixel in micron, e.g.; Pixel per Unit=2.304526 |
| mes\_geometry | varchar(2) |  |  |
| only\_ew | boolean |  |  |
| configuration\_filename | varchar(128) | null | name of the configuration file applied |
| data\_filename | varchar(128) | null | name of the file with the data |
| image\_filename | varchar(64) | null | name of the image file |
| editing\_level | varchar(4) |  | level of manual editing High (Hi), moderate (Mo), minimal (Mi), none (No) |
| from | decimal(4,0) |  | Location of the data stored (possibly to be found again) |
| to | decimal(4,0) |  |  |

2.21.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| measure\_info\_ak\_1 | sample\_id, subpiece\_label, system, software, software\_version, magnification, editing\_level |  |

2.21.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| measure\_info\_idx\_1 | id (ASC), sample\_id (ASC), subpiece\_label (ASC), system (ASC), software (ASC), software\_version (ASC), magnification (ASC), editing\_level (ASC) |  |

## 2.22. Table parenchyma

**Description:** 
This table will contain information/data about Tracheid data (cell measurements from softwood species) for measurement that performed along selected radial files (for tracheidogram) as for measured with Axiovision or ImageJ

2.22.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | serial | PK | A unique identification for the parenchyma |
| ring\_id | int |  |  |
| xcal | decimal(10,4) |  | Xcal - X-value of cell in calibrated coordinate system [microns] [Roxas] |
| position | int |  | Ordered cell position within the radial file (in order of production) |
| area | decimal(10,4) |  | area of the parenchyma in the ring [micron2] |
| double\_cwtrad | decimal(10,4) | null | Radial double cell wall thickness [micron] |

2.22.2. Alternate keys

|  |  |  |
| --- | --- | --- |
| **Key name** | **Columns** | **Description** |
| parenchyma\_ak\_1 | ring\_id, position |  |

2.22.3. Indexes

|  |  |  |
| --- | --- | --- |
| **Index name** | **Columns** | **Description** |
| parenchyma\_idx\_1 | id (ASC), ring\_id (ASC) |  |

## 2.23. Table editing\_fk

**Description:** 
This table contain a list of editing level

2.23.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| editing\_level | varchar(4) | PK | A unique identification for the species |
| description | varchar(64) |  | level of manual editing High (Hi), moderate (Mo), minimal (Mi), none (No) |

## 2.24. Table system\_fk

**Description:** 
This table contain a list of measuring systems

2.24.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| system | varchar(10) | PK | A unique identification for the measuring system (the process used to collect the data), e.g Image analysis from scanner (Im\_scanner) from light microscopy (Im\_micro), confocal microscope (Im\_confo), slide-scanner (Im\_sidescan), (X\_ray), Silviscan (Silvi) |
| description | text |  |  |

## 2.25. Table software\_fk

**Description:** 
This table contain a list of measuring software

2.25.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| software | varchar(10) | PK | A unique identification for the species |
| description | varchar(64) |  | Name of the measuring software, e.g ImageJ, Roxas, WinCell, Walesch, .. |

## 2.26. Table mes\_geometry\_fk

**Description:** 
This table contain a list of measurement geometry

2.26.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| mes\_geometry | varchar(2) | PK | A unique identification for the species |
| description | varchar(64) |  | Linear sample (L) or circular sample (C) |

## 2.27. Table clima\_param\_fk

**Description:** 
This table contain a list of climatic factors

2.27.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| param | varchar(10) | PK | source for the climatic data, e.g Temp, Precip, SPEI1, ... |
| description | text |  |  |

## 2.28. Table sample\_type\_fk

**Description:** 
This table contain a list of cell types

2.28.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| sample\_type | varchar(20) | PK | A unique identification for the cell type |
| description | varchar(64) |  | Category of cell type micro section V = Vessel P = Parenchyma F = Fiber B = Band integration |

## 2.29. Table soil\_depth\_fk

**Description:** 
This table contain a list of species code

2.29.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| soil\_depth | varchar(20) | PK | A unique identification for the species |
| description | varchar(64) |  | A four character code to identify the species, e.g. LADE = Larix decidua |

## 2.30. Table soil\_water\_fk

**Description:** 
This table contain a list of species code

2.30.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| soil\_water\_capacity | varchar(20) | PK | A unique identification for the species |
| description | varchar(64) |  | A four character code to identify the species, e.g. LADE = Larix decidua |

## 2.31. Table species\_composition\_fk

**Description:** 
This table contain a list of species code

2.31.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| species\_composition | varchar(20) | PK | A unique identification for the species |
| description | varchar(64) |  | A four character code to identify the species, e.g. LADE = Larix decidua |

## 2.32. Table management\_fk

**Description:** 
This table contain a list of species code

2.32.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| management | varchar(20) | PK | A unique identification for the species |
| description | varchar(64) |  | A four character code to identify the species, e.g. LADE = Larix decidua |

## 2.33. Table target\_proxy\_fk

**Description:** 
This table contain a list of target proxies

2.33.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| target\_proxy | varchar(20) | PK | A unique identification for the species |
| description | varchar(64) |  | A 20 character code to identify the target proxy, e.g. cell anatomy, X-ray density, blue light density |

## 2.34. Table explore\_option\_summary

**Description:** 
The summary table of all possible combinations of site ids and table id

2.34.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | int | PK |  |
| site\_id | int |  |  |
| person\_id | int |  |  |
| last\_name | varchar(64) |  |  |

## 2.35. Table global\_table

**Description:** 
A table that extract and summarise the most relevant information from the dataset for facilitating interaction to shiny

2.35.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| id | int | PK |  |
| target\_proxy | varchar(64) |  |  |
| cell\_type | varchar(64) |  |  |
| organ | varchar(64) |  |  |
| site\_id | int |  |  |
| site\_code | varchar(5) |  |  |
| country\_code | varchar(2) |  |  |
| longitude | decimal(10,7) |  |  |
| latitude | decimal(10,7) |  |  |
| species\_code | varchar(4) |  |  |
| n\_trees | int |  |  |
| n\_radii\_tree | int |  |  |
| n\_rings | int |  |  |
| max\_to | decimal(4) |  |  |
| max\_from | decimal(4) |  |  |
| system | varchar(10) |  |  |
| software | varchar(10) |  |  |
| average\_ring\_width | decimal(8,2) |  |  |
| average\_eww | decimal(8,2) | null |  |
| average\_lww | decimal(8,2) | null |  |
| contact\_last\_name | varchar(64) |  |  |
| contact\_first\_name | varchar(64) |  |  |
| contact\_email | varchar(64) |  |  |
| contact\_institution\_code | varchar(5) |  |  |

## 2.36. Table clima\_data\_source\_fk

**Description:** 
This table contain a list of climatic factors

2.36.1. Columns

|  |  |  |  |
| --- | --- | --- | --- |
| **Column name** | **Type** | **Properties** | **Description** |
| source | varchar(10) | PK | source for the climatic data, e.g Temp, Precip, SPEI1, ... |
| description | text |  |  |

# 3. References

## 3.1. Reference Tree\_site

|  |  |  |
| --- | --- | --- |
| **site** | **0..\*** | **tree** |
| id | <-> | site\_id |

## 3.2. Reference Cell\_ring

|  |  |  |
| --- | --- | --- |
| **ring** | **0..\*** | **profile** |
| id | <-> | ring\_id |

## 3.3. Reference publication\_site

|  |  |  |
| --- | --- | --- |
| **site** | **0..\*** | **publication** |
| id | <-> | site\_id |

## 3.4. Reference data\_owners\_site

|  |  |  |
| --- | --- | --- |
| **site** | **0..\*** | **person\_role** |
| id | <-> | site\_id |

## 3.5. Reference Tree\_species\_fk

|  |  |  |
| --- | --- | --- |
| **species\_fk** | **0..\*** | **tree** |
| species\_code | <-> | species\_code |

## 3.6. Reference site\_country\_fk

|  |  |  |
| --- | --- | --- |
| **country\_fk** | **0..\*** | **site** |
| country\_code | <-> | country\_code |

## 3.7. Reference institution\_fk\_country\_fk

|  |  |  |
| --- | --- | --- |
| **country\_fk** | **0..\*** | **institution\_fk** |
| country\_code | <-> | country\_code |

## 3.8. Reference contributor\_institution\_fk

|  |  |  |
| --- | --- | --- |
| **institution\_fk** | **0..\*** | **person** |
| institution\_code | <-> | institution\_code |

## 3.9. Reference data\_owners\_person

|  |  |  |
| --- | --- | --- |
| **person** | **0..\*** | **person\_role** |
| id | <-> | person\_id |

## 3.10. Reference data\_contribution\_person\_role

|  |  |  |
| --- | --- | --- |
| **role\_fk** | **0..\*** | **person\_role** |
| id | <-> | role |

## 3.11. Reference comments\_person

|  |  |  |
| --- | --- | --- |
| **person** | **0..\*** | **comments** |
| id | <-> | person\_id |

## 3.12. Reference Tree\_status\_fk

|  |  |  |
| --- | --- | --- |
| **status\_fk** | **0..\*** | **tree** |
| status\_code | <-> | status\_code |

## 3.13. Reference Core\_type\_fk

|  |  |  |
| --- | --- | --- |
| **organ\_fk** | **0..\*** | **wood\_sample** |
| organ | <-> | organ |

## 3.14. Reference Core\_Tree

|  |  |  |
| --- | --- | --- |
| **tree** | **0..\*** | **wood\_sample** |
| id | <-> | tree\_id |

## 3.15. Reference Core\_cell\_type\_fk

|  |  |  |
| --- | --- | --- |
| **cell\_type\_fk** | **0..\*** | **wood\_sample** |
| cell\_type | <-> | cell\_type |

## 3.16. Reference tracheid\_row\_ring

|  |  |  |
| --- | --- | --- |
| **ring** | **0..\*** | **tracheid\_row** |
| id | <-> | ring\_id |

## 3.17. Reference tracheid\_full\_ring

|  |  |  |
| --- | --- | --- |
| **ring** | **0..\*** | **tracheid\_full** |
| id | <-> | ring\_id |

## 3.18. Reference vessel\_ring

|  |  |  |
| --- | --- | --- |
| **ring** | **0..\*** | **vessel** |
| id | <-> | ring\_id |

## 3.19. Reference Archiving\_wood\_sample

|  |  |  |
| --- | --- | --- |
| **wood\_sample** | **0..\*** | **measure\_info** |
| id | <-> | sample\_id |

## 3.20. Reference clima\_site

|  |  |  |
| --- | --- | --- |
| **site** | **1..1** | **clima** |
| id | <-> | site\_id |

## 3.21. Reference measure\_info\_editing\_fk

|  |  |  |
| --- | --- | --- |
| **editing\_fk** | **0..\*** | **measure\_info** |
| editing\_level | <-> | editing\_level |

## 3.22. Reference measure\_info\_software\_fk

|  |  |  |
| --- | --- | --- |
| **software\_fk** | **0..\*** | **measure\_info** |
| software | <-> | software |

## 3.23. Reference measure\_info\_system\_fk

|  |  |  |
| --- | --- | --- |
| **system\_fk** | **0..\*** | **measure\_info** |
| system | <-> | system |

## 3.24. Reference parenchyma\_ring

|  |  |  |
| --- | --- | --- |
| **ring** | **0..\*** | **parenchyma** |
| id | <-> | ring\_id |

## 3.25. Reference measure\_info\_mes\_geometry\_fk

|  |  |  |
| --- | --- | --- |
| **mes\_geometry\_fk** | **0..\*** | **measure\_info** |
| mes\_geometry | <-> | mes\_geometry |

## 3.26. Reference clima\_clima\_factor\_fk

|  |  |  |
| --- | --- | --- |
| **clima\_param\_fk** | **0..\*** | **clima** |
| param | <-> | param |

## 3.27. Reference wood\_sample\_Copy\_of\_cell\_type\_fk

|  |  |  |
| --- | --- | --- |
| **sample\_type\_fk** | **0..\*** | **wood\_sample** |
| sample\_type | <-> | sample\_type |

## 3.28. Reference site\_soil\_depth\_fk

|  |  |  |
| --- | --- | --- |
| **soil\_depth\_fk** | **0..\*** | **site** |
| soil\_depth | <-> | soil\_depth |

## 3.29. Reference site\_soil\_water\_fk

|  |  |  |
| --- | --- | --- |
| **soil\_water\_fk** | **0..\*** | **site** |
| soil\_water\_capacity | <-> | soil\_water\_capacity |

## 3.30. Reference site\_species\_composition\_fk

|  |  |  |
| --- | --- | --- |
| **species\_composition\_fk** | **0..\*** | **site** |
| species\_composition | <-> | species\_composition |

## 3.31. Reference site\_Management\_fk

|  |  |  |
| --- | --- | --- |
| **management\_fk** | **0..\*** | **site** |
| management | <-> | management |

## 3.32. Reference site\_target\_proxy\_fk

|  |  |  |
| --- | --- | --- |
| **target\_proxy\_fk** | **0..\*** | **site** |
| target\_proxy | <-> | target\_proxy |

## 3.33. Reference comments\_site

|  |  |  |
| --- | --- | --- |
| **site** | **0..\*** | **comments** |
| id | <-> | site\_id |

## 3.34. Reference ring\_measure\_info

|  |  |  |
| --- | --- | --- |
| **measure\_info** | **0..\*** | **ring** |
| id | <-> | subpiece\_id |

## 3.35. Reference explore\_option\_summary\_site

|  |  |  |
| --- | --- | --- |
| **site** | **0..\*** | **explore\_option\_summary** |
| id | <-> | site\_id |

## 3.36. Reference explore\_option\_summary\_person

|  |  |  |
| --- | --- | --- |
| **person** | **0..\*** | **explore\_option\_summary** |
| id | <-> | person\_id |

## 3.37. Reference clima\_clima\_data\_source\_fk

|  |  |  |
| --- | --- | --- |
| **clima\_data\_source\_fk** | **0..\*** | **clima** |
| source | <-> | source |