Forest Inventory and Analysis Database: MySQL to rFIA combatible tables

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FIA Database

Forest Inventory and Analysis (FIA) makes its data sets available to the public through FIA Data and Tools from FIA Data Mart.

Raw data collected by FIA is distributed through either SQLite3 State databases or FIA database (FIADB) comma-delimited files in FIADB version format (current is 1.9.0). The comma delimited files are Forest Vegetation Simulator (FVS) ready tables. However, State CSV tables are currently unavailable for download since April 13 2022.

rFIA package

At this stage , the R pacakge **rFIA** which is used to download and analyze state FIA data is not able to download/get the FIA data.

In this situation, we need a slight workaround to use **rFIA** package. I will lay out the steps to download SQLite3 State database and extract the tables into comma seperate files (*.csv), which are recognized by rFIA.

Download SQLITE database

SQLite 3 state databases contain FIADB data and FVS-ready data. So first, lets download the SQLITE database.

** Visit FIA DataMart Website at: https://apps.fs.usda.gov/fia/datamart/datamart_sqlite.html

You can reach there by searching "FIA data and Tools" in Google search bar. Than click on the first result. Scroll down if necessary to click (once) on "FIA DataMart." Finally, select SQLITE database on the left-hand side. This will prompt to open another page with the instruction to select database for your state of choice. Hover your mouse cursor over your state and click (left) once to begin the database download process.

Locate your download folder, and extract the geodatabase into approprite folder.

Install necessary r Packages

One R studio or R and install following packages

1) RSQlite
2) DBI

```
install.packages("RSQLite") #
install.packages("DBI") # communication between R and Database
```

FIA DataMart

FIADB Last updated Wed Apr 13 13:47:10 CDT 2022

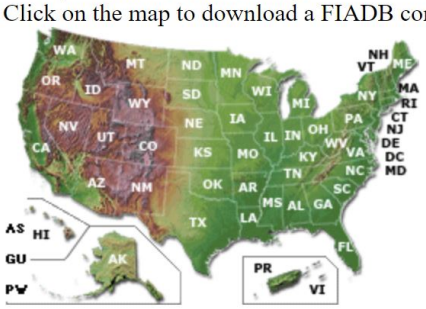
ALERT: STATE CSV TABLES ARE CURRENTLY UNAVAILABLE

The process used to generate the state CSV files failed on the last attempted run.

We are troubleshooting the issue and hope to have the files available again very soon.

CSV (comma-delimited files)

Click on the map to download a FIADB comma-delimited file containing all of the FIADB tables for a State.



Web citation: Sat Sep 04 17:00:10 CDT 2021. Forest Inventory and Analysis Database, St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station. [Available only on internet: http://apps.fs.fed.us/fiadb-downloads/datamart.html]

Figure 1: State Tables are Not Availble

note: Installation of *Rtools* is important, make sure that this program is installed. Remember *Rtools* is not a R package.

Generate state tables

Lets recap. So far we installed required packages, downloaded and extracted FIA database (*.db). now lets load these packages and export table that can be recognized by `rFIA`.

```
library(RSQLite)
library(DBI)
## Set dbname and driver out of convenience
myDB <- "./FIA_GA_TABLES/SQLite_FIADB_GA/FIADB_GA.db"
conn <- dbConnect(drv = SQLite(), dbname= myDB)
```

Now we successfully build the connection. We can look at the list of tables

`dput(dbListTables(conn))`.

We can also read specific tables such as condition table; *COND*

```
cond<- dbReadTable(conn = conn,name = 'COND')

head(cond)[1:5,1:6]
```

```
##                CN          PLT_CN INVYR STATECD UNITCD COUNTYCD
## 1 502168539126144 385729446489998  2016      13      3      169
## 2 502168540126144 385729446489998  2016      13      3      169
## 3 502168633126144 385729447489998  2016      13      3        9
## 4 502171899126144 385729680489998  2016      13      1      267
## 5 502171923126144 385729681489998  2016      13      1      183
```

Export Tables

With `conn` object we know that we can read all tables, therefore, export tables to require format.

```
for(file in fname){
  dtable<- dbReadTable(conn = conn,name = file)
  nm<- paste0("GA_",file,".csv")

write.csv(dtable,na = "",sep = ",",row.names = FALSE,file = paste0("./GA_FIA_CSVS/",nm))

}
```

In the above code chunk each table is prefixed by **GA__**, because the the example database was for the state of Georgia. For texas, it should be **TX__**. The reason is when csv tables are available to download, this is the format we receive the data in.

Finally, with `write.csv` function we write one tables at a time in comma separated files.

Read csv tables

```
library(rFIA)

##-- Read FIA data from tables

gadb<- readFIA(dir = "./GA_FIA_CSVS/",nCores = 8)
```

```
print(gadb)
```

```
## ---- FIA Database Object -----
## Reporting Years:  1972 1982 1989 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 20
## States:           GEORGIA
## Total Plots:      27241
## Memory Used:      2618.4 Mb
## Tables:           COND COND_DWM_CALC INVASIVE_SUBPLOT_SPP P2VEG_SUBP_STRUCTURE PLOT POP_ESTN_UNIT PO
##
## $COND
## # A tibble: 84,222 x 153
##         CN  PLT_CN INVYR STATECD UNITCD COUNTYCD  PLOT CONDID COND_STATUS_CD
##      <dbl>   <dbl> <int>   <int>  <int>    <int> <int>  <int>          <int>
##  1 5.02e14 3.86e14  2016      13      3      169    21      1              1
##  2 5.02e14 3.86e14  2016      13      3      169    21      2              2
##  3 5.02e14 3.86e14  2016      13      3        9    11      1              1
##  4 5.02e14 3.86e14  2016      13      1      267    24      1              3
##  5 5.02e14 3.86e14  2016      13      1      183    18      1              1
##  6 5.02e14 3.86e14  2016      13      1      183    18      2              1
##  7 5.02e14 3.86e14  2016      13      1      183    13      1              1
##  8 5.02e14 3.86e14  2016      13      1      267    49      1              1
##  9 5.02e14 3.86e14  2016      13      1      267    49      2              2
## 10 5.02e14 3.86e14  2016      13      1      267    40      1              1
## # ... with 84,212 more rows, and 144 more variables:
## #   COND_NONSAMPLE_REASN_CD <int>, RESERVCD <int>, OWNCD <int>, OWNGRPCD <int>,
## #   FORINDCD <lgl>, ADFORCD <int>, FORTYPCD <int>, FLDTYPCD <int>,
## #   MAPDEN <int>, STDAGE <int>, STDSZCD <int>, FLDSZCD <int>, SITECLCD <int>,
## #   SICOND <int>, SIBASE <int>, SISP <int>, STDORGCD <int>, STDORGSP <int>,
## #   PROP_BASIS <chr>, CONDPROP_UNADJ <dbl>, MICRPROP_UNADJ <dbl>,
## #   SUBPPROP_UNADJ <dbl>, MACRPROP_UNADJ <lgl>, SLOPE <int>, ASPECT <int>, ...
##
## $COND_DWM_CALC
## # A tibble: 7,606 x 104
##         CN STATECD COUNTYCD  PLOT MEASYEAR INVYR CONDID EVALID  PLT_CN  CND_CN
##      <dbl>   <int>    <int> <int>    <int> <int>  <int>  <int>   <dbl>   <dbl>
##  1 4.77e14      13        3     4     2005  2005      1 131007 7.64e13 2.39e14
##  2 4.77e14      13       19    32     2005  2005      1 131007 2.91e13 2.39e14
##  3 4.77e14      13       19    32     2005  2005      2 131007 2.91e13 2.39e14
##  4 4.77e14      13       21    18     2005  2005      1 131007 7.64e13 2.45e14
##  5 4.77e14      13       23     9     2005  2005      1 131007 2.91e13 2.39e14
##  6 4.77e14      13       39    76     2005  2005      1 131007 2.91e13 2.39e14
##  7 4.77e14      13       27    25     2005  2005      1 131007 2.91e13 2.39e14
##  8 4.77e14      13       31    20     2005  2005      1 131007 2.91e13 2.39e14
##  9 4.77e14      13       31    20     2005  2005      2 131007 2.91e13 2.39e14
## 10 4.77e14      13       35    19     2005  2005      1 131007 2.91e13 2.39e14
## # ... with 7,596 more rows, and 94 more variables: STRATUM_CN <dbl>,
## #   PHASE <lgl>, CONDPROP_CWD <dbl>, CONDPROP_FWD_SM <dbl>,
## #   CONDPROP_FWD_MD <dbl>, CONDPROP_FWD_LG <dbl>, CONDPROP_DUFF <dbl>,
## #   CWD_TL_COND <dbl>, CWD_TL_UNADJ <int>, CWD_TL_ADJ <dbl>,
## #   CWD_LPA_COND <dbl>, CWD_LPA_UNADJ <dbl>, CWD_LPA_ADJ <dbl>,
## #   CWD_VOLCF_COND <dbl>, CWD_VOLCF_UNADJ <dbl>, CWD_VOLCF_ADJ <dbl>,
## #   CWD_DRYBIO_COND <dbl>, CWD_DRYBIO_UNADJ <dbl>, CWD_DRYBIO_ADJ <dbl>, ...
##
```

```
## $INVASIVE_SUBPLOT_SPP
## # A tibble: 46,569 x 15
##         CN  PLT_CN INVYR STATECD UNITCD COUNTYCD  PLOT  SUBP CONDID VEG_FLDSPCD
##      <dbl>   <dbl> <int>   <int>  <int>    <int> <int> <int>  <int> <chr>
##  1 4.99e14 1.54e14  2009      13      1      175    37     2      1 LOJA
##  2 4.99e14 1.54e14  2009      13      1      175    37     3      1 LIGUS2
##  3 4.99e14 1.54e14  2009      13      1      175    37     3      1 LOJA
##  4 4.99e14 1.54e14  2009      13      1      175    37     3      2 LIGUS2
##  5 4.99e14 1.54e14  2009      13      1      175    37     3      2 LOJA
##  6 4.99e14 1.54e14  2009      13      1      175    37     4      2 LIGUS2
##  7 4.99e14 1.54e14  2009      13      1      175    37     4      2 LOJA
##  8 4.99e14 1.54e14  2009      13      3      181    11     1      1 LOJA
##  9 4.99e14 1.54e14  2009      13      3      181    11     2      1 LOJA
## 10 4.99e14 1.54e14  2009      13      3      181    11     4      1 NADO
## # ... with 46,559 more rows, and 5 more variables: UNIQUE_SP_NBR <int>,
## #   VEG_SPCD <chr>, COVER_PCT <int>, CYCLE <int>, SUBCYCLE <int>
##
## $P2VEG_SUBP_STRUCTURE
## # A tibble: 49,850 x 14
##         CN  PLT_CN STATECD UNITCD COUNTYCD  PLOT INVYR  SUBP CONDID
##      <dbl>   <dbl>   <int>  <int>    <int> <int> <int> <int>  <int>
##  1 1.83e14 2.59e14      13      1        1     8  2012     1      1
##  2 1.83e14 2.59e14      13      1        1     8  2012     1      1
##  3 1.83e14 2.59e14      13      1        1     8  2012     1      1
##  4 1.83e14 2.59e14      13      1        1     8  2012     1      1
##  5 1.83e14 2.59e14      13      1        1     8  2012     1      1
##  6 1.83e14 2.59e14      13      1        1     8  2012     1      1
##  7 1.83e14 2.59e14      13      1        1     8  2012     1      1
##  8 1.83e14 2.59e14      13      1        1     8  2012     1      1
##  9 1.83e14 2.59e14      13      1        1     8  2012     1      1
## 10 1.83e14 2.59e14      13      1        1     8  2012     1      1
## # ... with 49,840 more rows, and 5 more variables: GROWTH_HABIT_CD <chr>,
## #   LAYER <int>, COVER_PCT <int>, CYCLE <int>, SUBCYCLE <int>
##
## $PLOT
## # A tibble: 68,438 x 66
##         CN  SRV_CN    CTY_CN PREV_PLT_CN INVYR STATECD UNITCD COUNTYCD  PLOT
##      <dbl>   <dbl>     <int>       <dbl> <int>   <int>  <int>    <int> <int>
##  1 3.86e14 3.86e14 678010478     2.36e14  2016      13      5      187     6
##  2 3.86e14 3.86e14 640010478     2.36e14  2016      13      5      111    26
##  3 3.86e14 3.86e14 678010478     2.36e14  2016      13      5      187     8
##  4 3.86e14 3.86e14 646010478     2.36e14  2016      13      5      123    15
##  5 3.86e14 3.86e14 627010478     2.36e14  2016      13      5       85     8
##  6 3.86e14 3.86e14 678010478     2.36e14  2016      13      5      187    12
##  7 3.86e14 3.86e14 627010478     2.36e14  2016      13      5       85     2
##  8 3.86e14 3.86e14 627010478     2.36e14  2016      13      5       85    12
##  9 3.86e14 3.86e14 615010478     2.36e14  2016      13      3       61    26
## 10 3.86e14 3.86e14 615010478     2.36e14  2016      13      3       61    18
## # ... with 68,428 more rows, and 57 more variables: PLOT_STATUS_CD <int>,
## #   PLOT_NONSAMPLE_REASN_CD <int>, MEASYEAR <int>, MEASMON <int>,
## #   MEASDAY <int>, REMPER <dbl>, KINDCD <int>, DESIGNCD <int>, RDDISTCD <int>,
## #   WATERCD <int>, LAT <dbl>, LON <dbl>, ELEV <int>, GROW_TYP_CD <int>,
## #   MORT_TYP_CD <int>, P2PANEL <int>, P3PANEL <int>, ECOSUBCD <chr>,
## #   CONGCD <int>, MANUAL <dbl>, KINDCD_NC <lgl>, QA_STATUS <int>,
```

```
## #   MICROPLOT_LOC <chr>, DECLINATION <lgl>, EMAP_HEX <lgl>, ...
##
## $POP_ESTN_UNIT
## # A tibble: 2,028 x 13
##         CN EVAL_CN  RSCD EVALID ESTN_UNIT ESTN_UNIT_DESCR STATECD AREALAND_EU
##      <dbl>   <dbl> <int>  <int>     <int> <chr>              <int>       <dbl>
##  1 2.18e14 2.18e14    33 137202       131 131                   13      162539
##  2 2.18e14 2.18e14    33 137202       133 133                   13      214804
##  3 2.18e14 2.18e14    33 137202       135 135                   13      188179
##  4 2.18e14 2.18e14    33 137202       137 137                   13      140020
##  5 2.18e14 2.18e14    33 137202       139 139                   13      153147
##  6 2.18e14 2.18e14    33 137202       141 141                   13      273487
##  7 2.18e14 2.18e14    33 137202       143 143                   13      144495
##  8 2.18e14 2.18e14    33 137202       145 145                   13      239912
##  9 2.18e14 2.18e14    33 137202       147 147                   13       54664
## 10 2.18e14 2.18e14    33 137202       149 149                   13      161039
## # ... with 2,018 more rows, and 5 more variables: AREATOT_EU <dbl>,
## #   AREA_USED <dbl>, AREA_SOURCE <chr>, P1PNTCNT_EU <int>, P1SOURCE <chr>
##
## $POP_EVAL
## # A tibble: 95 x 15
##         CN EVAL_GRP_CN  RSCD EVALID EVAL_DESCR               STATECD LOCATION_NM
##      <dbl>       <dbl> <int>  <int> <chr>                     <int> <chr>
##  1 2.18e14     2.18e14    33 137201 GEORGIA 1972: CURRENT V~      13 Georgia
##  2 2.18e14     2.18e14    33 137202 GEORGIA 1972: CURRENT A~      13 Georgia
##  3 2.18e14     2.18e14    33 137203 GEORGIA 1961 to 1972: G~      13 Georgia
##  4 2.18e14     2.18e14    33 138201 GEORGIA 1982: CURRENT V~      13 Georgia
##  5 2.18e14     2.18e14    33 138202 GEORGIA 1982: CURRENT A~      13 Georgia
##  6 2.18e14     2.18e14    33 138203 GEORGIA 1972 to 1982: G~      13 Georgia
##  7 2.17e14     2.17e14    33 138901 GEORGIA 1989: CURRENT V~      13 Georgia
##  8 2.17e14     2.17e14    33 138902 GEORGIA 1989: CURRENT A~      13 Georgia
##  9 2.17e14     2.17e14    33 138903 GEORGIA 1982 to 1989: G~      13 Georgia
## 10 9.95e14     9.95e14    33 132000 GEORGIA 2020: 2015-2020~      13 Georgia
## # ... with 85 more rows, and 8 more variables: REPORT_YEAR_NM <chr>,
## #   START_INVYR <int>, END_INVYR <dbl>, LAND_ONLY <chr>, TIMBERLAND_ONLY <chr>,
## #   GROWTH_ACCT <chr>, ESTN_METHOD <chr>, NOTES <chr>
##
## $POP_EVAL_GRP
## # A tibble: 27 x 6
##         CN  RSCD EVAL_GRP EVAL_GRP_DESCR                              STATECD NOTES
##      <dbl> <int>    <int> <chr>                                        <int> <chr>
##  1 2.18e14    33   131972 GEORGIA 1972: CURRENT AREA, CURRENT VOL~      13 REGI~
##  2 2.54e14    33   132005 GEORGIA 2005: ALL AREA, CURRENT AREA, C~      13 PROC~
##  3 2.54e14    33   132006 GEORGIA 2006: ALL AREA, CURRENT AREA, C~      13 PROC~
##  4 2.54e14    33   132007 GEORGIA 2007: ALL AREA, CURRENT AREA, C~      13 PROC~
##  5 2.54e14    33   132008 GEORGIA 2008: ALL AREA, CURRENT AREA, C~      13 PROC~
##  6 2.54e14    33   132009 GEORGIA 2009: ALL AREA, CURRENT AREA, C~      13 PROC~
##  7 2.54e14    33   132010 GEORGIA 2010: ALL AREA, CURRENT AREA, C~      13 PROC~
##  8 2.54e14    33   131998 GEORGIA 1998: ALL AREA, CURRENT AREA, C~      13 PROC~
##  9 2.63e14    33   132013 GEORGIA 2013: ALL AREA, CURRENT AREA, C~      13 Proc~
## 10 2.96e13    33   132011 GEORGIA 2011: ALL AREA, CURRENT AREA, C~      13 Proc~
## # ... with 17 more rows
##
## $POP_EVAL_TYP
```

```
## # A tibble: 5,999 x 4
##         CN EVAL_GRP_CN EVAL_CN EVAL_TYP
##      <dbl>       <dbl>   <dbl> <chr>
##  1 3.86e14     3.86e14 3.86e14 EXPCURR
##  2 2.54e14     2.54e14 2.54e14 EXPCURR
##  3 2.54e14     2.54e14 2.54e14 EXPALL
##  4 3.86e14     3.86e14 3.86e14 EXPVOL
##  5 2.05e13     2.54e14 2.05e13 EXPCHNG
##  6 3.86e14     3.86e14 3.86e14 EXPCHNG
##  7 3.86e14     3.86e14 3.86e14 EXPGROW
##  8 3.86e14     3.86e14 3.86e14 EXPMORT
##  9 3.86e14     3.86e14 3.86e14 EXPREMV
## 10 3.86e14     3.86e14 3.86e14 EXPREGEN
## # ... with 5,989 more rows
##
## $POP_PLOT_STRATUM_ASSGN
## # A tibble: 567,443 x 12
##    CN        STRATUM_CN  PLT_CN STATECD INVYR UNITCD COUNTYCD  PLOT  RSCD EVALID
##    <chr>          <dbl>   <dbl>   <int> <int>  <int>    <int> <int> <int>  <int>
##  1 61072072~    6.11e14 2.16e14      13  2014      1       39    43    33 131709
##  2 61072072~    6.11e14 2.16e14      13  2014      1       39    11    33 131709
##  3 61072072~    6.11e14 2.16e14      13  2014      1       49    62    33 131709
##  4 61072072~    6.11e14 2.16e14      13  2014      1      165    33    33 131709
##  5 61072072~    6.11e14 2.16e14      13  2014      1      165    32    33 131709
##  6 61072073~    6.11e14 2.16e14      13  2014      1      175    37    33 131709
##  7 61072073~    6.11e14 2.16e14      13  2014      1      209    12    33 131709
##  8 61072073~    6.11e14 2.16e14      13  2014      1      209    22    33 131709
##  9 61072073~    6.11e14 2.16e14      13  2014      1      209    28    33 131709
## 10 61072073~    6.11e14 2.16e14      13  2014      1      229    36    33 131709
## # ... with 567,433 more rows, and 2 more variables: ESTN_UNIT <int>,
## #   STRATUMCD <int>
##
## $POP_STRATUM
## # A tibble: 4,467 x 24
##         CN ESTN_UNIT_CN  RSCD EVALID ESTN_UNIT STRATUMCD STRATUM_DESCR   STATECD
##      <dbl>        <dbl> <int>  <int>     <int>     <int> <chr>             <int>
##  1 7.23e14      7.31e14    33 131807       999        47 11-47% CANOPY ~      13
##  2 7.23e14      7.31e14    33 131807       999        84 48-84% CANOPY ~      13
##  3 7.23e14      7.31e14    33 131807       999       100 85-100% CANOPY~      13
##  4 7.23e14      7.31e14    33 131807       803        99 00-99% CANOPY_~      13
##  5 7.23e14      7.31e14    33 131807       803       100 100% CANOPY_CO~      13
##  6 7.23e14      7.31e14    33 131809         4        10 00-10% CANOPY ~      13
##  7 7.23e14      7.31e14    33 131809         4        47 11-47% CANOPY ~      13
##  8 7.23e14      7.31e14    33 131809         4        84 48-84% CANOPY ~      13
##  9 7.23e14      7.31e14    33 131809         4       100 85-100% CANOPY~      13
## 10 7.23e14      7.31e14    33 131809         1        10 00-10% CANOPY ~      13
## # ... with 4,457 more rows, and 16 more variables: P1POINTCNT <int>,
## #   P2POINTCNT <int>, EXPNS <dbl>, ADJ_FACTOR_MACR <int>,
## #   ADJ_FACTOR_SUBP <dbl>, ADJ_FACTOR_MICR <dbl>, ADJ_FACTOR_CWD <dbl>,
## #   ADJ_FACTOR_FWD_SM <dbl>, ADJ_FACTOR_FWD_LG <dbl>, ADJ_FACTOR_DUFF <dbl>,
## #   ADJ_FACTOR_PILE <dbl>, ADJ_FACTOR_REGEN_MICR <lgl>,
## #   ADJ_FACTOR_INV_SUBP <dbl>, ADJ_FACTOR_P2VEG_SUBP <lgl>,
## #   ADJ_FACTOR_GRNDLYR_MICROQUAD <lgl>, ADJ_FACTOR_SOIL <lgl>
##
```

```
## $SEEDLING
## # A tibble: 140,416 x 26
##         CN  PLT_CN INVYR STATECD UNITCD COUNTYCD  PLOT  SUBP CONDID  SPCD
##      <dbl>   <dbl> <int>   <int>  <int>    <int> <int> <int>  <int> <int>
##  1 9.93e14 7.19e14  2020      13      3      269    51     4      1   972
##  2 9.93e14 7.19e14  2020      13      2       93    24     4      3   544
##  3 9.93e14 7.19e14  2020      13      2       93    25     2      1   131
##  4 9.93e14 7.19e14  2020      13      2       93    25     3      2   131
##  5 9.93e14 7.19e14  2020      13      2       93    25     3      2   762
##  6 9.93e14 7.19e14  2020      13      2       93    25     3      2   827
##  7 7.20e14 5.34e14  2018      13      5      213    87     4      1   129
##  8 6.04e14 4.51e14  2017      13      4      113     3     1      1   611
##  9 6.04e14 4.51e14  2017      13      4      113     3     2      1   131
## 10 6.04e14 4.51e14  2017      13      4      113     3     2      1   611
## # ... with 140,406 more rows, and 16 more variables: SPGRPCD <int>,
## #   STOCKING <dbl>, TREECOUNT <int>, TOTAGE <lgl>, TREECOUNT_CALC <int>,
## #   TPA_UNADJ <dbl>, CYCLE <int>, SUBCYCLE <int>, DAMAGE_AGENT_CD1_SRS <lgl>,
## #   PCT_AFFECTED_DAMAGE_AGENT1_SRS <lgl>, DAMAGE_AGENT_CD2_SRS <lgl>,
## #   PCT_AFFECTED_DAMAGE_AGENT2_SRS <lgl>, DAMAGE_AGENT_CD3_SRS <lgl>,
## #   PCT_AFFECTED_DAMAGE_AGENT3_SRS <lgl>, AGECD_RMRS <lgl>,
## #   COUNTCHKCD_RMRS <lgl>
##
## $SUBP_COND
## # A tibble: 187,271 x 16
##         CN  PLT_CN INVYR STATECD UNITCD COUNTYCD  PLOT  SUBP CONDID
##      <dbl>   <dbl> <int>   <int>  <int>    <int> <int> <int>  <int>
##  1 2.59e14 2.36e14  2011      13      3       37    12     3      1
##  2 2.59e14 2.36e14  2011      13      3       37    12     4      2
##  3 2.59e14 2.36e14  2011      13      1       39    44     1      1
##  4 2.59e14 2.36e14  2011      13      1       39    44     2      1
##  5 2.59e14 2.36e14  2011      13      1       39    44     3      1
##  6 2.59e14 2.36e14  2011      13      1       39    44     4      1
##  7 2.59e14 2.36e14  2011      13      1       39    12     1      1
##  8 2.59e14 2.36e14  2011      13      1       39    12     2      1
##  9 2.59e14 2.36e14  2011      13      1       39    12     3      1
## 10 2.59e14 2.36e14  2011      13      1       39    12     4      1
## # ... with 187,261 more rows, and 7 more variables: MICRCOND_PROP <dbl>,
## #   SUBPCOND_PROP <dbl>, MACRCOND_PROP <lgl>, NONFR_INCL_PCT_SUBP <lgl>,
## #   NONFR_INCL_PCT_MACRO <lgl>, CYCLE <int>, SUBCYCLE <int>
##
## $SUBP_COND_CHNG_MTRX
## # A tibble: 221,489 x 9
##         CN STATECD  SUBP SUBPTYP  PLT_CN CONDID PREV_PLT_CN PREVCOND
##      <dbl>   <int> <int>   <int>   <dbl>  <int>       <dbl>    <int>
##  1 8.13e14      13     4       2 2.83e14      2     1.77e14        2
##  2 8.13e14      13     1       1 2.83e14      1     1.77e14        1
##  3 8.13e14      13     2       1 2.83e14      1     1.77e14        1
##  4 8.13e14      13     3       1 2.83e14      1     1.77e14        1
##  5 8.13e14      13     4       1 2.83e14      1     1.77e14        1
##  6 8.13e14      13     1       2 2.83e14      1     1.77e14        1
##  7 8.13e14      13     2       2 2.83e14      1     1.77e14        1
##  8 8.13e14      13     3       2 2.83e14      1     1.77e14        1
##  9 8.13e14      13     4       2 2.83e14      1     1.77e14        1
## 10 8.13e14      13     1       1 2.83e14      1     1.77e14        1
```

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## # ... with 221,479 more rows, and 1 more variable: SUBPTYP_PROP_CHNG <dbl>
##
## $SUBPLOT
## # A tibble: 443,946 x 46
##         CN  PLT_CN PREV_SBP_CN INVYR STATECD UNITCD COUNTYCD  PLOT  SUBP
##      <dbl>   <dbl> <lgl>       <int>   <int>  <int>    <int> <int> <int>
##  1 4.23e14 2.83e14 NA           2015      13      5      311    12     1
##  2 4.23e14 2.83e14 NA           2015      13      5      311    12     2
##  3 4.23e14 2.83e14 NA           2015      13      5      311    12     3
##  4 4.23e14 2.83e14 NA           2015      13      5      311    12     4
##  5 4.23e14 2.83e14 NA           2015      13      5      311    20     1
##  6 4.23e14 2.83e14 NA           2015      13      5      311    20     2
##  7 4.23e14 2.83e14 NA           2015      13      5      311    20     3
##  8 4.23e14 2.83e14 NA           2015      13      5      311    20     4
##  9 4.23e14 2.83e14 NA           2015      13      5      291     3     1
## 10 4.23e14 2.83e14 NA           2015      13      5      291     3     2
## # ... with 443,936 more rows, and 37 more variables: SUBP_STATUS_CD <int>,
## #   POINT_NONSAMPLE_REASN_CD <int>, MICRCOND <int>, SUBPCOND <int>,
## #   MACRCOND <lgl>, CONDLIST <int>, SLOPE <int>, ASPECT <int>, WATERDEP <dbl>,
## #   P2A_GRM_FLG <chr>, CYCLE <int>, SUBCYCLE <int>,
## #   ROOT_DIS_SEV_CD_PNWRS <lgl>, NF_SUBP_STATUS_CD <lgl>,
## #   NF_SUBP_NONSAMPLE_REASN_CD <lgl>, P2VEG_SUBP_STATUS_CD <int>,
## #   P2VEG_SUBP_NONSAMPLE_REASN_CD <int>, INVASIVE_SUBP_STATUS_CD <int>, ...
##
## $SURVEY
## # A tibble: 27 x 12
##         CN INVYR P3_OZONE_IND STATECD STATEAB STATENM  RSCD ANN_INVENTORY NOTES
##      <dbl> <int> <chr>          <int> <chr>   <chr>   <int> <chr>         <chr>
##  1 1.59e14  1972 N                 13 GA      Georgia    33 N             "Peri~
##  2 1.59e14  1982 N                 13 GA      Georgia    33 N             "Peri~
##  3 2.05e13  1989 N                 13 GA      Georgia    33 N             "Peri~
##  4 2.91e13  2005 N                 13 GA      Georgia    33 Y             ""
##  5 7.67e13  2006 N                 13 GA      Georgia    33 Y             ""
##  6 1.24e14  2007 N                 13 GA      Georgia    33 Y             ""
##  7 1.44e14  2008 N                 13 GA      Georgia    33 Y             ""
##  8 1.54e14  2009 N                 13 GA      Georgia    33 Y             ""
##  9 5.34e14  2018 N                 13 GA      Georgia    33 Y             ""
## 10 2.83e14  2015 N                 13 GA      Georgia    33 Y             ""
## # ... with 17 more rows, and 3 more variables: CYCLE <int>, SUBCYCLE <int>,
## #   PRJ_CN <dbl>
##
## $TREE
## # A tibble: 1,745,048 x 201
##         CN  PLT_CN PREV_TRE_CN INVYR STATECD UNITCD COUNTYCD  PLOT  SUBP  TREE
##      <dbl>   <dbl>       <dbl> <int>   <int>  <int>    <int> <int> <int> <int>
##  1 1.59e14 1.59e14          NA  1972      13      1        1 90001   101     1
##  2 1.59e14 1.59e14          NA  1972      13      1        1 90001   101     2
##  3 1.59e14 1.59e14          NA  1972      13      1        1 90001   102     1
##  4 1.59e14 1.59e14          NA  1972      13      1        1 90001   102     2
##  5 1.59e14 1.59e14          NA  1972      13      1        1 90001   102     3
##  6 1.59e14 1.59e14          NA  1972      13      1        1 90001   102     4
##  7 1.59e14 1.59e14          NA  1972      13      1        1 90001   102     5
##  8 1.59e14 1.59e14          NA  1972      13      1        1 90001   102     6
##  9 1.59e14 1.59e14          NA  1972      13      1        1 90001   103     1
```

```
## 10 1.59e14 1.59e14          NA  1972      13      1        1 90001   103     2
## # ... with 1,745,038 more rows, and 191 more variables: CONDID <int>,
## #   AZIMUTH <lgl>, DIST <lgl>, PREVCOND <int>, STATUSCD <int>, SPCD <int>,
## #   SPGRPCD <int>, DIA <dbl>, DIAHTCD <int>, HT <int>, HTCD <int>,
## #   ACTUALHT <int>, TREECLCD <int>, CR <int>, CCLCD <int>, TREEGRCD <int>,
## #   AGENTCD <int>, CULL <int>, DAMLOC1 <int>, DAMTYP1 <int>, DAMSEV1 <int>,
## #   DAMLOC2 <int>, DAMTYP2 <int>, DAMSEV2 <int>, DECAYCD <int>, STOCKING <dbl>,
## #   WDLDSTEM <int>, VOLCFNET <dbl>, VOLCFGRS <dbl>, VOLCSNET <dbl>, ...
##
## $TREE_GRM_BEGIN
## # A tibble: 68,799 x 26
##     TRE_CN PREV_TRE_CN  PLT_CN STATECD  SPCD   DIA DIAHTCD TREE_SIZE TREECLCD
##      <dbl>       <dbl>   <dbl>   <int> <int> <dbl>   <int> <chr>        <int>
##  1 2.51e14     2.39e14 4.33e13      13   694  1.2        1 SAPLING          2
##  2 2.51e14     2.39e14 4.33e13      13   621  1.1        1 SAPLING          2
##  3 2.51e14     2.39e14 4.33e13      13   621  1.6        1 SAPLING          2
##  4 2.51e14     2.39e14 4.33e13      13   838  4.78       1 SAPLING          3
##  5 2.51e14     2.39e14 4.33e13      13   694  1.4        1 SAPLING          2
##  6 2.51e14     2.39e14 4.33e13      13   694  2          1 SAPLING          2
##  7 2.51e14     2.39e14 4.33e13      13   694  1.1        1 SAPLING          2
##  8 2.51e14     2.39e14 4.33e13      13   621  1.1        1 SAPLING          2
##  9 2.51e14     2.39e14 4.33e13      13   694  1.1        1 SAPLING          2
## 10 2.51e14     2.39e14 4.33e13      13   621  1.1        1 SAPLING          2
## # ... with 68,789 more rows, and 17 more variables: SUBPTYP <int>,
## #   VOLCFSND <dbl>, VOLCFNET <dbl>, VOLCSNET <dbl>, VOLBFNET <dbl>,
## #   REGIONAL_DRYBIOT <dbl>, REGIONAL_DRYBIOM <dbl>, REGIONAL_DRYBIOSL <dbl>,
## #   DRYBIO_BG <dbl>, DRYBIO_AG <dbl>, DRYBIO_WDLD_SPP <lgl>,
## #   DRYBIO_SAPLING <dbl>, DRYBIO_STUMP <dbl>, DRYBIO_BOLE <dbl>,
## #   DRYBIO_SAWLOG <dbl>, DRYBIO_TOP <dbl>, VOLBSNET <lgl>
##
## $TREE_GRM_COMPONENT
## # A tibble: 896,174 x 86
##     TRE_CN PREV_TRE_CN  PLT_CN STATECD DIA_BEGIN DIA_MIDPT DIA_END
##      <dbl>       <dbl>   <dbl>   <int>     <dbl>     <dbl>   <dbl>
##  1 2.47e14          NA 5.66e13      13        NA        NA      NA
##  2 2.47e14          NA 5.66e13      13        NA        NA      NA
##  3 2.47e14          NA 5.66e13      13        NA        NA      NA
##  4 2.47e14          NA 5.66e13      13        NA        NA      NA
##  5 2.47e14          NA 5.66e13      13        NA        NA      NA
##  6 2.47e14          NA 5.66e13      13        NA        NA      NA
##  7 2.47e14          NA 5.66e13      13        NA        NA      NA
##  8 2.47e14          NA 5.66e13      13        NA        NA      NA
##  9 2.47e14          NA 5.66e13      13        NA        NA      NA
## 10 2.47e14          NA 5.66e13      13        NA        NA      NA
## # ... with 896,164 more rows, and 79 more variables: ANN_DIA_GROWTH <dbl>,
## #   HT_BEGIN <int>, HT_MIDPT <int>, HT_END <int>, ANN_HT_GROWTH <dbl>,
## #   SUBPTYP_BEGIN <int>, SUBPTYP_MIDPT <int>, SUBPTYP_END <int>,
## #   STEM_COMPONENT <chr>, MICR_COMPONENT <chr>, SUBP_COMPONENT <chr>,
## #   MACR_COMPONENT <chr>, GSTK_COMPONENT <chr>, SWLG_COMPONENT <chr>,
## #   GSTK_BEGIN <chr>, GSTK_MIDPT <chr>, GSTK_END <chr>,
## #   SWLG_DIA_THRESHOLD <int>, SWLG_BEGIN <chr>, SWLG_MIDPT <chr>, ...
##
## $TREE_GRM_MIDPT
## # A tibble: 691,048 x 25
```

```
##     TRE_CN PREV_TRE_CN  PLT_CN STATECD   DIA DIAHTCD TREE_SIZE TREECLCD SUBPTYP
##      <dbl>       <dbl>   <dbl>   <int> <dbl>   <int> <chr>        <int>   <int>
##  1 9.93e14     4.23e14 7.19e14      13  6.6        1 SMALL            2       1
##  2 9.93e14     4.23e14 7.19e14      13  7.35       1 SMALL            3       1
##  3 9.93e14    NA       7.19e14      13  5.18       1 SMALL            2       1
##  4 9.93e14     4.23e14 7.19e14      13  8.79       1 SMALL            3       1
##  5 9.93e14     4.23e14 7.19e14      13 11.2        1 LARGE            2       1
##  6 9.93e14     4.23e14 7.19e14      13  7.57       1 SMALL            2       1
##  7 9.93e14     4.23e14 7.19e14      13 12.2        1 LARGE            2       1
##  8 9.93e14     4.23e14 7.19e14      13 11.6        1 LARGE            2       1
##  9 9.93e14     4.23e14 7.19e14      13  4          1 SAPLING          2       2
## 10 9.93e14     4.23e14 7.19e14      13  7.94       1 SMALL            2       1
## # ... with 691,038 more rows, and 16 more variables: VOLCFSND <dbl>,
## #   VOLCFNET <dbl>, VOLCSNET <dbl>, VOLBFNET <dbl>, REGIONAL_DRYBIOT <dbl>,
## #   REGIONAL_DRYBIOM <dbl>, REGIONAL_DRYBIOSL <dbl>, DRYBIO_BG <dbl>,
## #   DRYBIO_AG <dbl>, DRYBIO_WDLD_SPP <dbl>, DRYBIO_SAPLING <dbl>,
## #   DRYBIO_STUMP <dbl>, DRYBIO_BOLE <dbl>, DRYBIO_SAWLOG <dbl>,
## #   DRYBIO_TOP <dbl>, VOLBSNET <lgl>
```

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#---------------------- The End-----------------------------------------------#
```