Package 'smwrData'

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Title Example hydrologic data to support statistical methods in water resources

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Description Datasets as data.frames and as text files from U.S. Geological Survey publications.

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LazyLoad yes

LazyData yes

NeedsCompilation no

R topics documented:

`smwrData-package` *Example Hydrologic Data*

Description

The smwrData package provides example hydrologic data to support statistical methods in water resources.

Details

Package:	USGSwsData
Type:	Package
Version:	1.1.1
Date:	2015-11-02
License:	CC0

This package contains the following datasets.

AppalachianSpecCap	Well Characteristics
ChoptankFlow	Daily Streamflow
ChoptankNH3	Stream Water Quality
ConecuhFlows	Annual Streamflow
CuyahogaTDS	Stream Water Quality
EasternIowaNO3	Groundwater Quality
GlacialRidge	Daily Groundwater Levels
IonBalance	Stream Water Quality
KlamathTP	Stream Water Quality
MayflyNymph	Stream Water Quality
MC11_1993	Soil Temperature
MenomineeMajorIons	Stream Water Quality
MiningIron	Stream Water Quality
MiscGW	Groundwater Quality
PrecipNitrogen	Precipitation Water Quality
PugetNitrate	Groundwater Quality
Q05078470	Daily Streamflow
Q05078770	Daily Streamflow
Qall	Daily Streamflow
QW05078470	Stream Water Quality
QWall	Stream Water Quality
QWstacked	Stream Water Quality
SaddlePeaks	Annual Peak Streamflow
TNLoads	Stream Water Quality

UraniumTDS Groundwater Quality

The folder named misc contains three additional ASCII files. The file TestFull.rdb is an ASCII relational database (RDB) file constructed by James R. Slack (retired USGS). The use of dots as a delimiter for date data is not standard and is no longer supported. The file TestPart.csv is a comma-separated variable file that contains three columns from the TestFull.rdb file. The file TestPart.meta contains meta-information about the columns in TestPart.csv.

Author(s)

Dave Lorenz, with data contributions from James R. Slack and Jim Tesoriero.

Maintainer: Dave Lorenz <lorenz@usgs.gov>

References

Helsel, D.R., and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p. Available at http://pubs.usgs.gov/twri/twri4a3/.

Lorenz, D.L., 2015, smwrData—An R package of example hydrologic data, version 1.1.1, U.S. Geological Survey Open-File Report 2015–1103, 5 p. Available at http://pubs.usgs.gov/publication/ofr20151103.

AppalachianSpecCap *Well characteristics*

Description

Natural logarithms of specific capacity of wells in four rock types within the Appalachian Mountain region of Pennsylvania.

Usage

```
AppalachianSpecCap
```

Format

Data frame with 200 rows and 2 columns

Name	Type	Description
LogSpecCap	numeric	Natural log of the specific capacity
RockType	factor	Type of rock

Source

Appendix C7 in Helsel and Hirsch (2002).

References

Helsel, D.R., and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p.

Examples

```
data(AppalachianSpecCap)
# Create simple boxplots by Rock type
with(AppalachianSpecCap, boxplot(split(LogSpecCap, RockType), range=0))
```

`ChoptankFlow` *Daily Streamflow*

Description

Selected daily flow data for Choptank River near Greensboro, Maryland, USGS station number 01491000.

Usage

```
ChoptankFlow
```

Format

Data frame with 8035 rows and 5 columns

Name	Type	Description
agency_cd	character	Agency code
site_no	character	USGS station number
datetime	Date	Day
Flow	numeric	Daily mean streamflow
Flow_cd	character	Daily mean streamflow code

Note: the daily mean streamflow rates are in cubic feet per second.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/md/nwis/sw) on 2012-06-19.

Examples

```
data(ChoptankFlow)
# The hydrograph for the entire record retrieved
par(mfrow=c(2,1), mar=c(4.1, 4.1, 1.1, 1.1))
with(ChoptankFlow, plot(datetime, Flow, type='l'))
# The hydrograph for a "typical water year"
with(subset(ChoptankFlow, datetime >= "2003-10-01" & datetime <= "2004-09-30"),
  plot(datetime, Flow, type='l'))
```

ChoptankNH3 *Stream Water Quality*

Description

Selected ammonia concentration data for Choptank River near Greensboro, Maryland, USGS station number 01491000.

Usage

```
ChoptankNH3
```

Format

Data frame with 182 rows and 13 columns

Name	Type	Description
agency_cd	character	Agency code
site_no	character	USGS station number
sample_dt	Date	Sample date
sample_tm	character	Sample time
time_datum_cd	character	Time zone datum
parm_cd	character	Parameter code
remark_cd	character	Remark code for the value
result_va	character	Numeric value of the result
val_qual_tx	character	Result value qualifier code
meth_cd	character	Lab method code
dqi_cd	character	Data-quality indicator code
rpt_lev_va	character	Reporting level
rpt_lev_cd	character	Reporting level type

Note: all concentrations in the column result_va are in milligrams per liter as nitrogen.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/md/nwis/qwdata) on 2012-06-18. Column names are preserved as retrieved, but unnecessary columns were deleted.

Examples

```
data(ChoptankNH3)
# Concentration values plotted over time--black is uncensored, red represents
# a less-than value and green are E-coded (less than the reporting level, but
# greater than the detection limit).
with(ChoptankNH3, plot(sample_dt, result_va, col=as.factor(remark_cd)))
```

ConecuhFlows *Annual Streamflow*

Description

Annual streamflows from 1941 through 1960 for the Conecuh River at Brantley, Alabama, USGS station number 02371500.

Usage

```
ConecuhFlows
```

Format

Data frame with 20 rows and 2 columns

Name	Type	Description
Year	integer	Water year
Flow	integer	Annual mean flow

Note: the annual mean flow rates are cubic feet per second.

Source

Appendix C2 in Helsel and Hirsch (2002).

References

Helsel, D.R., and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p.

Examples

```
data(ConecuhFlows)
# The apparent "break" beginning in 1950 is climatological.
with(ConecuhFlows, plot(Year, Flow))
```

CuyahogaTDS *Stream Water Quality*

Description

U.S. Geological Survey National Stream Quality Accounting Network (NASQAN) station: Cuyahoga River at Independence, Ohio (04208000).

Usage

```
CuyahogaTDS
```

Format

Data frame with 80 rows and 4 columns

Name	Type	Description
MONTH	integer	Month number
TIME	numeric	Sample collection time, in decimal years
TDS	integer	Total dissolved solids concentration, milligrams per liter
Q	integer	Streamflow, in cubic feet per second

Source

Appendix C9 in Helsel and Hirsch (2002).

References

Helsel, D.R., and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p.

Examples

```
data(CuyahogaTDS)
# TDS concentration is inversely related to flow
with(CuyahogaTDS, plot(Q, TDS, log='xy'))
```

---

dataRd *Prototype of an R Documentation File*

Description

Facilitate the constructing of files documenting R data.frames.

Usage

```
dataRd(obj, file = NULL, obname = deparse(substitute(obj)),
  format = c("roxygen", "man"))
```

Arguments

obj	the name of the dataset to document.
file	the output filename.
obname	a character string giving the name of the object.
format	a character string specifying the format of the output; "roxygen" generates a file that is an R script with a roxygen header and should be placed in the R folder and "man" generates a file that is an Rd file and should be placed in the man folder.

Details

When dataRd is used within a loop, use of obname facilitates using character strings for objects.

Value

The object name, from obname.

Note

The prototype file must be edited to include descriptions of the columns and complete the source and example.

See Also

prompt

EasternIowaNO3 *Groundwater Quality*

Description

Selected nitrite plus nitrate concentration data from wells in the National Water-Quality Assessment (NAWQA) Program in the eastern Iowa study unit survey.

Usage

```
EasternIowaNO3
```

Format

Data frame with 30 rows and 12 columns

Name	Type	Description
su_code	character	Study unit code
site_no	character	USGS station number
C1sample_dt	Date	Cycle 1 sample date
C1sample_tm	character	Cycle 1 sample time
C1time_zone	character	Cycle 1 time zone datum
C1Nitrate.rmk	character	Cycle 1 remark code for nitrite plus nitrate concentration
C1Nitrate	numeric	Cycle 1 nitrite plus nitrate concentration
C2sample_dt	Date	Cycle 2 sample date
C2sample_tm	character	Cycle 2 sample time
C2time_zone	character	Cycle 2 time zone datum
C2Nitrate.rmk	character	Cycle 2 remark code for nitrite plus nitrate concentration
C2Nitrate	numeric	Cycle 2 nitrite plus nitrate concentration

Note: all concentrations are in milligrams per liter as nitrogen.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/ia/nwis/qw) on 2012-06-18. The data were rearranged and columns renamed to create matching data from each well. These data represent the nitrite plus nitrate concentration in a survey in eastern Iowa. The cycle 1 samples were collected during the summer of 1998, and the cycle 2 samples were collected during the summer of 2007.

The description of the study unit and the cycle 1 data are described in Sadorf and Linart (2000).

References

Sadorf, E.M, and Linart, S.M., 2000, Ground-water quality in alluvial aquifers in the eastern Iowa basins, Iowa and Minnesota: U.S. Geological Survey Water-Resources Investigations Report 00-4106, 46 p.

Examples

```
data(EasternIowaNO3)
# Show the change from cycle 1 to 2, ignoring censoring
par(mar=c(5.1, 12.1, 1.1, 1.1))
plot(EasternIowaNO3$C1Nitrate, seq(nrow(EasternIowaNO3)), ylab="", xlab="Nitrate",
 yaxt='n', xlim=c(0, 25))
points(EasternIowaNO3$C2Nitrate, seq(nrow(EasternIowaNO3)), col='green')
axis(2, at=seq(nrow(EasternIowaNO3)), labels=EasternIowaNO3$site_no, las=1)
```

GlacialRidge *Daily Groundwater Levels*

Description

Daily groundwater data for water year 2008 (October 1, 2007 to September 30, 2008) for selected wells in the Glacial Ridge National Wildlife Refuge in northwestern Minnesota.

Usage

```
GlacialRidge
```

Format

Data frame with 366 rows and 6 columns

Name	Type	Description
datetime	Date	Day
G01	numeric	Data for well G01-R
G12	numeric	Data for well G12-R
G20	numeric	Data for well G20S-R
G25	numeric	Data for well G25-R
G22	numeric	Data for well G22S-R

Note all groundwater levels are depth below land surface in feet.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/mn/nwis/gw) on 2012-06-18. The data were rearranged and the columns renamed to the current format.

References

Cowdery, T. K., Lorenz, D. L, Arntson, D., 2008, Hydrology prior to wetland and prairie restoration in and around the Glacial Ridge National Wildlife Refuge, northwestern Minnesota, 2002–5: U.S Geological Survey Scientific Investigations Report 2007-5200, 68 p.

Examples

```
data(GlacialRidge)
# Hydrographs showing the change in variability with depth
with(GlacialRidge, plot(datetime, G01, type='l', ylim=c(25, 0),
  ylab="Depth below landsurface, in feet"))
with(GlacialRidge, lines(datetime, G12))
with(GlacialRidge, lines(datetime, G20))
with(GlacialRidge, lines(datetime, G25))
with(GlacialRidge, lines(datetime, G22))
```

IonBalance *Stream Water Quality*

Description

Selected ion balance data for County Ditch 65 near Maple Bay, Minnesota (SW2), USGS station number 05079250.

Usage

```
IonBalance
```

Format

Data frame with 22 rows and 28 columns

Name	Type	Description
SAMPLE	character	Sample record number
AGNCY	character	Agency code
STAID	character	USGS station number
DATES	Date	Sample date
TIMES	character	Sample time
EDATE	Date	Sample end date (all missing)
ETIME	character	Sample end time (all missing)
MEDIUM	character	Sample medium code (surface water)
H_ion	numeric	Hydrogen ion concentration
Ca	numeric	Calcium ion concentration

Mg	numeric	Magnesium ion concentration
Na	numeric	Sodium ion concentration
K	numeric	Potassium ion concentration
Fe	numeric	Iron ion concentration (all missing)
Mn	numeric	Manganese ion concentration (all missing)
Cation_sum	numeric	Sum of all available cation concentrations
Alk	numeric	Alkalinity concentration
Hydrox	numeric	Hydroxide ion concentration (all missing)
Bicarb	numeric	Bicarbonate ion concentration (all missing)
Carb	numeric	Carbonate ion concentration (all missing)
NO2NO3	numeric	Nitrite plus nitrate ion concentration
NO2	numeric	Nitrite ion concentration (all missing)
NO3	numeric	Nitrate ion concentration (all missing)
Cl	numeric	Chloride ion concentration
SO4	numeric	Sulfate ion concentration
F	numeric	Fluoride ion concentration
Anion_sum	numeric	Sum of all available anion concentrations
Pct_Diff	numeric	Percent difference beteeen `Cation_sum` and `Anion_sum`

Note: all concentrations are in milli-equivalents per liter.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/mn/nwis/qw) on 2012-01-19. The data were modified to represt the concentrations in milli-equivalents per liter.

Examples

```
data(IonBalance)
# Create a scatter plot matrix of the cations
# Shows the correlation amongst those variables.
# Note that potassium (K) is negatively correlated to the others!
pairs(IonBalance[,c("Ca", "Mg", "Na", "K")])
```

KlamathTP *Stream Water Quality*

Description

Total phosphorus concentrations and streamflow data from the Klamath River near Klamath, California, USGS station number 11530500.

Usage

```
KlamathTP
```

Format

Data frame with 80 rows and 6 columns

Name	Type	Description
site_no	character	USGS station number
sample_dt	Date	Sample date
TP_rmk	character	Remark code for total phosphorus concentration
TP	numeric	Total phosphorus concetration
Flow	numeric	Streamflow, may be either daily mean or measured
TP_ss	numeric	Total phosphorus concetration, modified for censoring

Note: all concentrations are in milligrams per liter as phosphorus, the streamflow rates are in cubic feet per second.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/ca/nwis/qw) on 2012-07-13. The data were retrieved and modified to replicate the results in Smith and others (1982).

References

Smith, R.A., Hirsch, R.M, and Slack, J.R., 1982, A study of trends in total phosphorus measurements at NASQAN stations: U.S. Geological Circular 2190, 34 p. Also available at http://pubs.usgs.gov/wsp/2190/report.pdf.

Examples

```
data(KlamathTP)
par(mfrow=c(2,1), mar=c(5.1, 4.1, .5, .5))
# TP concentration over time (figure 11A in Smith and others (1982))
with(KlamathTP, plot(sample_dt, TP_ss))
abline(.15, -0.0000137) # Coefficients modified for actual graph units
# Flow (or discharge) and TP concentration (figure 3A in Smith and others, 1982)
with(KlamathTP, plot(Flow, TP_ss))
abline(0.014, 0.0000054) # Note difference in intercept
```

`MayflyNymph` *Stream Water Quality*

Description

Mayfly nymph counts in small streams above and below an industrial outfall.

Usage

```
MayflyNymph
```

Format

Data frame with 12 rows and 2 columns

Name	Type	Description
Above	integer	Mayfly nymph counts above the industrial outfall
Below	integer	Mayfly nymph counts below the industrial outfall

Source

Table 6.1 in Helsel and Hirsch (2002).

References

Helsel, D.R. and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p.

Examples

```
data(MayflyNymph)
# Compare the counts above and below the industrial outfalls
boxplot(MayflyNymph, range=0, log='y')
```

MC11_1993 *Soil Temperature*

Description

Daily soil- and reference-temperature data for observation well MC11 for March 1, 1993 through November 30, 1993.

Usage

```
MC11_1993
```

Format

Data frame with 271 rows and 10 columns

Name	Type	Description
YEAR	numeric	Year of measurement
JULIAN	numeric	The Julian day of the year of the measurement
MONTH	numeric	Month of measurement
DAY	numeric	Day of month of measurement
TEMP.REF	numeric	Reference temperature in shelter
TEMP.0.5	numeric	Soil temperature at 0.5 meter depth
TEMP.1.0	numeric	Soil temperature at 1.0 meter depth
TEMP.1.5	numeric	Soil temperature at 1.5 meter depth
TEMP.2.0	numeric	Soil temperature at 2.0 meter depth
TEMP.2.5	numeric	Soil temperature at 2.5 meter depth

Note: all temperatures are in degrees Celsius.

Source

Extracted from the MC11 file on the CDROM in Landon and others (1997).

References

Landon, M.K., Delin, G.N., Nelson, K.J., Regan, C.P., Lamb, J.A., Larson, S.J., Capel, P.D., Anderson, J.L., and Dowdy, R.H., 1997, Water-quality and hydrogeologic data used to evaluate the effects of farming systems on ground-water quality at the Management Systems Evaluation Area near Princeton, Minnesota, 1991-95: U.S. Geological Survey Open-File Report 97-22, 31 p.

Examples

```
## Not run:
data(MC11_1993)
# plot the reference temperature
with(MC11_1993, plot(JULIAN, TEMP.REF, type='l'))

## End(Not run)
```

MenomineeMajorIons *Stream Water Quality*

Description

Concentrations of selected major ions in the Menominee River near McAllister, Wisconsin, USGS station number 04067500.

Usage

```
MenomineeMajorIons
```

Format

Data frame with 37 rows and 25 columns

Name	Type	Description
agency.cd	character	Agency code
site.no	character	USGS station number
sample.dt	Date	Sample date
medium.cd	character	Sample medium code
CO3.rmk	character	Remark code for carbonate concentration
CO3	numeric	Carbonate concentration
HCO3.rmk	character	Remark code for bicarbonate concentration
HCO3	numeric	Bicarbonate concentration
Nitrate.rmk	character	Remark code for nitrate concentration
Nitrate	numeric	Nitrate concentration
Calcium.rmk	character	Remark code for calcium concentration
Calcium	numeric	Calcium concentration

Magnesium.rmk	character	Remark code for magnesium concentration
Magnesium	numeric	Magnesium concentration
Sodium.rmk	character	Remark code for sodium concentration
Sodium	numeric	Sodium concentration
Potassium.rmk	character	Remark code for potassium concentration
Potassium	numeric	Potassium concentration
Chloride.rmk	character	Remark code for chloride concentration
Chloride	numeric	Chloride concentration
Sulfate.rmk	character	Remark code for sulfate concentration
Sulfate	numeric	Sulfate concentration
Fluoride.rmk	character	Remark code for fluoride concentration
Fluoride	numeric	Fluoride concentration
season	factor	Season

Note: all concentrations are in milligrams per liter as the constituent, except nitrate concentrations are in milligrams per liter as nitrogen.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/wi/nwis/qw) on 2002-12-30. Data were rearranged and columns renamed to the current format.

Examples

```
data(MenomineeMajorIons)
# Create a scatter plot matrix of the major anions
# Nitrate and Fluoride have censored values and single high values that do not plot well
pairs(MenomineeMajorIons[,c("HCO3", "Chloride", "Sulfate")])
```

`MiningIron` *Stream Water Quality*

Description

Iron concentrations at low flow for small eastern Ohio streams.

Usage

```
MiningIron
```

Format

Data frame with 241 rows and 4 columns

Name	Type	Description
Iron	numeric	Iron concentration
Rock	factor	Rock type of the stream
MineType	factor	Description of mining activity
C5	factor	Used to construct table C5

Source

Appendix C6 in Helsel and Hirsch (2002).
Note: A different set of randomly selected values are used to reconstruct table C5 than what was selected in Helsel and Hirsch (2002).

References

Helsel, D.R., 1983, Mine drainage and rock type influences on eastern Ohio stream water quality: Water Resources Bulletin, v. 19, no. 6, p. 881–887.

Helsel, D.R., and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p.

Examples

```
data(MiningIron)
# Create simple boxplots by rock type and by mining activity
par(mfrow=c(2,1), las=1)
with(MiningIron, boxplot(split(Iron, Rock), range=0, log='y'))
with(MiningIron, boxplot(split(Iron, MineType), range=0, log='y'))
```

MiscGW *Groundwater Quality*

Description

Groundwater-quality data from miscellaneous wells in the United States.

Usage

```
MiscGW
```

Format

Data frame with 4 rows and 10 columns

Name	Type	Description
Calcium	numeric	Calcium concentration
Magnesium	numeric	Magnesium concentration
Sodium	numeric	Sodium concentration
Potassium	numeric	Potassium concentration
Carbonate	numeric	Carbonate concentration
Bicarbonate	numeric	Bicarbonate concentration
Sulfate	numeric	Sulfate concentration
Chloride	numeric	Chloride concentration
Fluoride	numeric	Fluoride concentration
Nitrate	numeric	Nitrate concentration

Notes: all concentrations are in milligrams per liter; for combined sodium and potassium in the original tables, the concentration was assumed to be sodium in these data and potassium is set to 0.

Source

Extracted from Hem (1989), to replicate the data in figure 37.

References

Hem J.D., 1989, Study and interpretation of the chemical characteristics of natural water: U.S. Geological Survey Water-Supply Paper 2254, 263 p.

Examples

```
## Not run:
data(MiscGW)
# The sodium-potassium data
MiscGW[, c("Sodium", "Potassium")]

## End(Not run)
```

PrecipNitrogen *Precipitation Water Quality*

Description

Ammonia plus organic nitrogen concentrations in precipitation.

Usage

```
PrecipNitrogen
```

Format

Data frame with 20 rows and 2 columns

Name	Type	Description
NH3plusOrganic	numeric	Concentration of ammonia plus organic nitrogen
Site	factor	Land-use type

Note: all concentrations are in milligrams per liter as nitrogen.

Source

Example data in chapter 5 in Helsel and Hirsch (2002)

References

Helsel, D.R. and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p.

Examples

```
data(PrecipNitrogen)
# Compare concentrations between residential and industrial land uses
with(PrecipNitrogen, boxplot(split(NH3plusOrganic, Site), range=0, log='y'))
```

`PugetNitrate` *Groundwater Quality*

Description

Selected groundwater nitrate and ancillary data collected near Puget Sound, Washington.

Usage

```
PugetNitrate
```

Format

Data frame with 1967 rows and 8 columns

Name	Type	Description
wellid	integer	Well identification number
l10	numeric	Percent urban land use wthin 3.2 km of well
l20	numeric	Percent agricultural land use wthin 3.2 kilometers of well
l40	numeric	Percent Forested land wthin 3.2 kilometers of well
surfgeo	character	Description of surficial geology at well
date	Date	Sample date
nitrate	numeric	Nitrate concentration, in milligrams per liter
wellmet	numeric	Well depth, in meters

For `surfgeo`, "Fine" and "Coarse" refer to fine-grained and coarse-grained glacial deposits.
Some censored nitrate concentrations are recorded as 0 in `nitrate` but the original data had multiple reporting levels of 0.05, 0.1, an 0.2. Therefore, all values less than or equal to 0.2 should be considered potentially censored.

Source

Data provided by Jim Tesoriero.

References

Tesoriero, A.J., and Voss, F.D., 1997, Predicting the probability of elevated nitrate concentrations in the Puget Sound Basin—Implications for aquifer susceptibility and vulnerability: Groundwater,

v. 35, no. 6, p. 1029–1039.

Examples

```
## Not run:
data(PugetNitrate)
# Suppress plotting the high value of 732 in Coarse
with(PugetNitrate, boxplot(split(pmin(nitrate, 50), surfgeo)))

## End(Not run)
```

`Q05078470` *Daily Streamflow*

Description

Daily mean flow for Judicial Ditch 64 near Mentor, Minnesota (SW4), USGS station number 05078470 for calendar year 2003.

Usage

```
Q05078470
```

Format

Data frame with 365 rows and 2 columns

Name	Type	Description
DATES	Date	Day
FLOW	numeric	Daily mean streamflow

Note: the daily mean streamflow rates are in cubic feet per second.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/mn/nwis/sw) on 2005-01-05.

Examples

```
data(Q05078470)
# Plot the data for station 05078470
with(Q05078470, plot(DATES, FLOW, type='l'))
```

Q05078770 *Daily Streamflow*

Description

Daily mean flow for Judicial Ditch 66 near Marcoux Corners, Minnesota (SW6), USGS station number 05078770 for calendar year 2003.

Usage

```
Q05078770
```

Format

Data frame with 365 rows and 2 columns

Name	Type	Description
DATES	Date	Day
FLOW	numeric	Daily mean streamflow

Note: the daily mean streamflow rates are in cubic feet per second.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/mn/nwis/sw) on 2005-01-05.

Examples

```
data(Q05078770)
# Plot the data for station 05078770
with(Q05078770, plot(DATES, FLOW, type='l', log='y'))
```

Qall *Daily Streamflow*

Description

Daily mean flow for selected USGS streamgages for calendar year 2003.

Usage

```
Qall
```

Format

Data frame with 365 rows and 3 columns

Name	Type	Description
DATES	Date	Day
Flow	numeric	Daily mean streamflow
STAID	character	USGS station number

Note: the daily mean streamflow rates are in cubic feet per second.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/mn/nwis/sw) on 2005-01-05.

Examples

```
data(Qall)
# Plot the data for station 05078770
with(subset(Qall, STAID == "05078770"), plot(DATES, Flow, type='l'))
# Overlay the data for station 05078470, some zero flows in this station
with(subset(Qall, STAID == "05078470"), lines(DATES, Flow, col='red'))
```

QW05078470 *Stream Water Quality*

Description

Selected water-quality data for Judicial Ditch 64 near Mentor, Minnesota (SW4), USGS station number 05078470 for calendar year 2003.

Usage

```
QW05078470
```

Format

Data frame with 11 rows and 4 columns

Name	Type	Description
DATES	Date	Sample date
TIMES	character	Sample time
R00665	character	Remark code for total phosphorus concentration
P00665	numeric	Total phosphorus concentration

Note: all concentrations are in milligrams per liter as phosphorus.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/mn/nwis/qw) on 2005-01-05.

Examples

```
data(QW05078470)
# Plot the data
with(QW05078470, plot(DATES, P00665, log='y'))
```

QWall *Stream Water Quality*

Description

Whole-water or total phosphorus data for selected USGS streamgages for calendar year 2003.

Usage

```
QWall
```

Format

Data frame with 23 rows and 4 columns

Name	Type	Description
STAID	character	USGS station number
DATES	Date	Sample date
TIMES	character	Sample time
R00665	character	Remark code for total phosphorus concentration
P00665	numeric	Total phosphorus concentration

Note: all concentrations are in milligrams per liter as phosphorus.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/mn/nwis/qw) on 2005-01-05.

Examples

```
data(QWall)
# Plot the data for station 05078770
with(subset(QWall, STAID == "05078770"), plot(DATES, P00665, log='y', ylim=c(0.001, 0.2)))
# Overlay the data for station 05078470, smaller values and missing the sample in late April.
with(subset(QWall, STAID == "05078470"), points(DATES, P00665, col='red'))
```

QWstacked *Stream Water Quality*

Description

Selected water-quality data for Judicial Ditch 64 near Mentor, Minnesota (SW4), USGS station number 05078470 for calendar year 2003.

Usage

```
QWstacked
```

Format

Data frame with 46 rows and 22 columns

Name	Type	Description
agency_cd	character	Agency code
site_no	character	USGS station number
sample_dt	Date	Sample date
sample_tm	character	Sample time
sample_end_dt	Date	Sample end date
sample_end_tm	character	Sample end time
sample_start_time_datum_cd	character	Time zone datum
tm_datum_rlbty_cd	character	Time datum reliability code
coll_ent_cd	character	Collecting agency code
medium_cd	character	Sample medium code
tu_id	character	Taxonomic unit code
body_part_id	character	Body part code
parm_cd	character	Analyte parameter code
remark_cd	character	Remark code for the result
result_va	character	Numeric value of the result
val_qual_tx	character	Result value qualifier code
meth_cd	character	Lab method code
dqi_cd	character	Data-quality indicator code
rpt_lev_va	character	Reporting level
rpt_lev_cd	character	Reporting level type
lab_std_va	character	Lab standard deviation
anl_ent_cd	character	Analyzing agency code

Note: all concentrations in the column result_va are in milligrams per liter as phosphorus.

Source

Data retrieved from NWISWeb (http://nwis.waterdata.usgs.gov/mn/nwis/qwdata) on 2012-04-06. The format of water-quality data is often retrieved by result–each row represents the data for

a single analyte. Note that many columns are part of the generic data retrieval and do not pertain specifically to these data.

Examples

```
data(QWstacked)
# Plot the data for whole-water phosphorus
with(subset(QWstacked, parm_cd == "00665"), plot(sample_dt, result_va))
# Overlay the data for dissolved phosphorus (should be smaller values)
with(subset(QWstacked, parm_cd == "00666"), points(sample_dt, result_va, col='red'))
```

SaddlePeaks *Annual Peak Streamflow*

Description

Annual peak discharges, 1925–1989, for the Saddle River at Lodi, New Jersey, USGS station number 01391500.

Usage

```
SaddlePeaks
```

Format

Data frame with 65 rows and 2 columns

Name	Type	Description
Year	integer	Water year
Flow	integer	Annual peak flow

Note: the annual peak flow rates are in cubic feet per second.

Source

Appendix C1 in Helsel and Hirsch (2002). Channelization occurred in 1968.

References

Helsel, D.R., and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p.

Examples

```
data(SaddlePeaks)
# The data are approximately log-normally distributed
qqnorm(SaddlePeaks$Flow, log='y')
with(SaddlePeaks, abline(mean(log10(Flow)), sd(log10(Flow))))
```

TNLoads *Stream Water Quality*

Description

Total nitrogen loads and basin characteristics for urban runoff.

Usage

```
TNLoads
```

Format

Data frame with 42 rows and 9 columns

Name	Type	Description
LOGTN	numeric	Log10 of (total nitrogen load, in pounds)
LOGDA	numeric	Log10 of (drainage area, in square miles)
LOGIMP	numeric	Log10 of (percentage impervious surface area [unitless])
MJTEMP	numeric	Mean minimum January temperature, in degrees Fahrenheit
MSRAIN	numeric	Mean seasonal rainfall, in inches
PRES	integer	Percentage of basin that is residential [unitless]
PNON	integer	Percentage of basin that is non-urban [unitless]
PCOMM	integer	Percentage of basin that is commercial [unitless]
PIND	integer	Percentage of basin that is industrial [unitless]

Source

Appendix C15 in Helsel and Hirsch (2002), from Mustard and others (1987).

References

Helsel, D.R., and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p.

Mustard, D.C., Driver, N.E., Chyr, J., and Hansen, B.G., 1987, U.S. Geological Survey urban stormwater data base of constituent storm loads: U.S. Geological Survey Water-Resources Investigations Report 87-4036, 328 p.

Examples

```
data(TNLoads)
# Create a scatter plot matrix of the first 5 columns
# Shows the correlation amongst those variables.
# The remaining variables are even more discretized than MSRAIN
pairs(TNLoads[,1:5])
```

UraniumTDS *Groundwater Quality*

Description

Uranium and total dissolved solids in groundwaters of differing bicarbonate concentrations.

Usage

```
UraniumTDS
```

Format

Data frame with 44 rows and 3 columns

Name	Type	Description
TDS	numeric	Total dissolved solids concentration, in milligrams per liter
Uranium	numeric	Uranium concentration, in parts per billion
HCO3	factor	Bicarbonate concentration relative to total anions

Source

Appendix C16 in Helsel and Hirsch (2002).

References

Helsel, D.R., and Hirsch, R.M., 2002, Statistical methods in water resources: U.S. Geological Survey Techniques of Water-Resources Investigations, book 4, chap. A3, 522 p.

Examples

```
data(UraniumTDS)
# The concentration of bicarbonate affects the relation between Uranium and TDS
# Bicarbonate concentration > 50% is plotted in red
with(UraniumTDS, plot(Uranium, TDS, col=HCO3, log='y'))
```

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