Package 'StreamCatTools'

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Type Package

Title 'StreamCatTools'

Version 0.10.0

Description Tools for using the 'StreamCat' and 'LakeCat' API and interacting with the 'StreamCat' and 'LakeCat' database. Convenience functions in the package wrap the API for 'StreamCat' on <https://api.epa.gov/StreamCat/streams/metrics>.

Depends R (>= 4.1.0)

Imports sf, nhdplusTools, jsonlite, httr2, curl (>= 6.0.0), ggpattern, patchwork, cowplot, tigris, ggplot2

Suggests dplyr, mapview, testthat, knitr, rmarkdown, devtools, xml2, magrittr, readr, tidyr, stringr, purrr, lifecycle, tidyselect

Encoding UTF-8

URL https://usepa.github.io/StreamCatTools/, https://github.com/USEPA/StreamCatTools

BugReports https://github.com/USEPA/StreamCatTools/issues

VignetteBuilder knitr,rmarkdown

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License CC0

NeedsCompilation no

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`lc_fullname` *Lookup Full Metric Name*

Description

Function to retrieve a full metric name based on the short name using the LakeCat API.

Usage

```
lc_fullname(metric = NULL)
```

Arguments

`metric`	Short metric name Syntax: metric=value1 Values: metric

Value

A lookup of the full name for a given LakeCat metric

Author(s)

Marc Weber

Examples

```
fullname <- lc_fullname(metric='clay')
```

lc_get_comid *Get Lake COMIDs*

Description

Function to return NHDPlusV2 Waterbody COMIDS using either a dataframe with coordinates and a specified CRS or an sf object. The function generates a vector of NHDPlus Waterbody COMID values a user can then pass to lc_get_data function

Usage

```
lc_get_comid(
  dd = NULL,
  xcoord = NULL,
  ycoord = NULL,
  crsys = NULL,
  buffer = NULL
)
```

Arguments

dd	Name of data frame object. Can be a simple data frame with coordinate columns in a known CRS or an sf points data frame
xcoord	The x coordinate column if using a raw data frame
ycoord	The y coordinate column if using a raw data frame
crsys	The epsg code if using a raw data frame
buffer	The amount of buffer to use to extend search for a waterbody (simply passed to nhdplusTools::get_waterbodies)

Value

A new sf data frame with a populated 'COMID' column

Author(s)

Marc Weber

Examples

```
## Not run:

dd <- data.frame(x = c(-89.198,-114.125,-122.044),
y = c(45.502,47.877,43.730))

comids <- lc_get_comid(dd, xcoord='x',
                       ycoord='y', crsys=4269)
```

```
dd <- data.frame(x = c(-89.198,-114.125,-122.044),
y = c(45.502,47.877,43.730)) |>
   sf::st_as_sf(coords = c('x', 'y'), crs = 4326)

comids <- lc_get_comid(dd)

## End(Not run)
```

`lc_get_data` *Get LakeCat data*

Description

Function to return LakeCat metrics using the StreamCat API. The function allows a user to get specific metric data aggregated by area of interest, returned by comid(s), hydroregion(s), state(s), or county(ies).

Usage

```
lc_get_data(
  comid = NULL,
  metric = NULL,
  aoi = NULL,
  showAreaSqKm = NULL,
  showPctFull = NULL,
  state = NULL,
  county = NULL,
  region = NULL,
  conus = NULL,
  countOnly = NULL
)
```

Arguments

`comid`	Return metric information for specific COMIDs. Can be a comma-delimited list, a character vector, or any object that can be coerced to a comma-delimited list with `paste`. One of `comid`, `county`, `state`, or `region` is required unless `conus='true'`. Syntax: comid=<comid1>,<comid2>
`metric`	Name(s) of metrics to query. Must be character string with comma-delimited list of metrics. **Not** *case-sensitive*. Syntax: name=<name1>,<name2>
`aoi`	Specify the area of interest described by a metric. By default, all available areas of interest for a given metric are returned. *Case-sensitive*. Syntax: areaOfInterest=<value1>,<value2> Values: catchment|watershed|
`showAreaSqKm`	Return the area in square kilometers of a given area of interest. The default value is false. Values: true|false
`showPctFull`	Return the pctfull for each dataset. The default value is false. Values: true|false

`state` Return metric information for COMIDs within a specific state. Use a state's abbreviation to query for a given state. One of `comid`, `county`, `state`, or `region` is required unless `conus='true'`. If specified *and valid*, `comid` and `county` are ignored. *Case-sensitive*. Syntax: state=<state1>,<state2>

`county` Return metric information for COMIDs within a specific county. Users must use the FIPS code, not county name, as a way to disambiguate counties. One of `comid`, `county`, `state`, or `region` is required unless `conus='true'`. If specified *and valid*, `comid` is ignored. Syntax: county=<county1>,<county1>

`region` Return metric information for COMIDs within a specified hydroregion. Hydroregions are specified using full name i.e. `'Region01'`, `'Region03N'`, `'Region10L'` One of `comid`, `county`, `state`, or `region` is required unless `conus='true'`. If specified *and valid*, `comid`, `county`, and `state` are ignored. *Case-sensitive*. Syntax: region=<regionid1>,<regionid2>

`conus` Return all COMIDs in the conterminous United States. Character string (**Not** *case-sensitive*) or logical. The default value is false. If true, `comid`, `county`, `state`, and `region` are ignored. Values: true|false

`countOnly` Return a CSV containing only the row count (ROWCOUNT) and the column count (COLUMNCOUNT) that the server expects to return in a request. The default value is false. Values: true|false

Value

A tibble of desired StreamCat metrics. If data are missing for all rows of a given metric, then the column for that metric will not exist. If data are missing for only some rows, then they will be specified with NA.

Author(s)

Marc Weber

Examples

```
## Not run:
df <- lc_get_data(comid='23794487', aoi='cat', metric='fert')

df <- lc_get_data(metric='pcturbmd2006', aoi='ws',
comid='24083377')

df <- lc_get_data(metric='pctgrs2006', aoi='ws', region='Region01')

df <- lc_get_data(metric='pctwdwet2006', aoi='ws', county='41003')

df <- lc_get_data(metric='pcturbmd2006', aoi='ws',
comid='24083377', showAreaSqKm=FALSE, showPctFull=TRUE)

df <- lc_get_data(metric='pcturbmd2006,damdens',
aoi='cat,ws', comid='23783629,23794487,23812618')

df <- lc_get_data(metric='pcturbmd2006,damdens',
```

```
aoi='cat,ws', comid=c('23783629','23794487','23812618'))

df <- lc_get_data(metric='pcturbmd2006,damdens',
aoi='cat,ws', comid='23783629,23794487,23812618',
countOnly=TRUE)



## End(Not run)
```

`lc_get_metric_names` *Get LakeCat Metric Names*

Description

Function to filter LakeCat metrics metrics by category, area of interest, dataset or year. Use 'lc_get_params(categories)' or 'lc_get_params(datasets)' to see all the valid category or dataset options

Usage

```
lc_get_metric_names(category = NULL, aoi = NULL, year = NULL, dataset = NULL)
```

Arguments

`category`	Filter LakeCat metrics based on the metric category
`aoi`	Filter LakeCat metrics based on the area of interest
`year`	Filter LakeCat metrics based on a particular year or years
`dataset`	Filter LakeCat metrics based on the dataset name

Value

A dataframe of merics and description that match filter criteria

Author(s)

Marc Weber

Examples

```
## Not run:
metrics <- lc_get_metric_names(category='Natural')
metrics <- lc_get_metric_names(category = c('Anthropogenic','Natural'),
aoi=c('Cat','Ws'))
## End(Not run)
```

lc_get_nni *Get NNI*

Description

Function to get all NNI data available for a given year.

Usage

```
lc_get_nni(
  year,
  aoi = NULL,
  comid = NULL,
  showAreaSqKm = TRUE,
  showPctFull = NULL,
  countOnly = NULL
)
```

Arguments

year	Years(s) of NNI metrics to query. Only valid NNI years are accepted (1987:2017) Syntax: year=<year1>,<year2>
aoi	Specify the area of interest described by a metric. By default, all available areas of interest for a given metric are returned. Syntax: areaOfInterest=<value1>,<value2> Values: catchment|watershed
comid	Return metric information for specific COMIDs Syntax: comid=<comid1>,<comid2>
showAreaSqKm	Return the area in square kilometers of a given area of interest. The default value is true. Values: true|false
showPctFull	Return the pctfull for each dataset. The default value is false. Values: true|false
countOnly	Return a CSV containing only the row count (ROWCOUNT) and the column count (COLUMNCOUNT) that the server expects to return in a request. The default value is false. Values: true|false

Value

A tibble of desired StreamCat metrics

Author(s)

Selia Markley

Examples

```
df <- lc_get_nni(year='1987, 1990, 2005, 2017', aoi='cat,ws',
comid='23783629,23794487,23812618')

df <- lc_get_nni(year='2015', aoi='cat',
comid='23783629', countOnly=TRUE)

df <- lc_get_nni(comid='23783629', year='2011, 2012', aoi='ws')
```

`lc_get_params` *Get LakeCat Parameters*

Description

Function to return available LakeCat parameters using the StreamCat API.

Usage

```
lc_get_params(param = NULL)
```

Arguments

`param`	List of available parameters in the API for the following options: name, areaofInterest, region, state, county. State and county return a data frame that includes FIPS codes, names and state abbreviations Syntax: param=<value1>,<value2> Values: name|area

Value

A list of all the current LakeCat values for a given parameter

Author(s)

Marc Weber

Examples

```
## Not run:
params <- lc_get_params(param='variable_info')
params <- lc_get_params(param='metric_names')
params <- sc_get_params(param='categories')
params <- lc_get_params(param='aoi')
params <- lc_get_params(param='state')
params <- lc_get_params(param='county')
params <- sc_get_params(param='datasets')

## End(Not run)
```

lc_plotnni *Plot National Nutrient Inventory data for lakes*

Description

Function to plot time series of nitrogen and phosphorus budgets for a given lake COMID. This function allows a user to return a time series of major inputs, outputs, and derived metrics of nitrogen and phosphorus. Plot is returned as an object

Usage

```
lc_plotnni(comid, include.nue = FALSE)
```

Arguments

comid	Identifier of lake COMID user wants to plot NNI data for. Must be a character string with the COMID digit. Syntax: com=<COMID>
include.nue	Include time series of nitrogen use efficiency in the returned plot. The default value is false. Values: true|false

Value

Return plot as an object.

Author(s)

Selia Markley

Examples

```
## Not run:
p <- lc_plotnni(comid='23794487')
p <- lc_plotnni(comid='23794487', include.nue=TRUE)

## End(Not run)
```

sc_fullname *Lookup Full Metric Name*

Description

Function to retrieve a full metric name based on the short name using the StreamCat API.

Usage

```
sc_fullname(metric = NULL)
```

Arguments

metric	Short metric name Syntax: metric=value1 Values: metric

Value

A lookup of the full name for a given StreamCat metric

Author(s)

Marc Weber

Examples

```
fullname <- sc_fullname(metric='clay')
```

---

sc_get_comid *Get COMIDs*

Description

Function to return NHDPlusV2 COMIDS using either a dataframe with coordinates and a specified CRS or an sf object. The function generates a vector of COMID values a user can then pass to sc_get_data function

Usage

```
sc_get_comid(dd = NULL, xcoord = NULL, ycoord = NULL, crsys = NULL)
```

Arguments

dd	Name of data frame object. Can be a simple data frame with coordinate columns in a known CRS or an sf points data frame
xcoord	The x coordinate column if using a raw data frame
ycoord	The y coordinate column if using a raw data frame
crsys	The epsg code if using a raw data frame

Value

A new sf data frame with a populated 'COMID' column

Author(s)

Marc Weber

Examples

```
## Not run:

dd <- data.frame(x = c(-122.649,-100.348,-75.186,-106.675),
y = c(45.085, 35.405,42.403,38.721))

comids <- sc_get_comid(dd, xcoord='x',
                       ycoord='y', crsys=4269)

dd <- sf::st_point_on_surface(sf::read_sf(system.file("shape/nc.shp", package="sf")))

comids <- sc_get_comid(dd)

comids <- sc_get_comid(dd, xcoord='x',
ycoord='y', crsys=4269)

dd <- sf::read_sf(system.file("shape/nc.shp", package="sf"))
comids <- sc_get_comid(dd)


## End(Not run)
```

---

sc_get_data *Get StreamCat data*

Description

Function to return StreamCat catchment and watershed metrics using the StreamCat API. The function allows a user to get specific metric data aggregated by area of interest, returned by comid(s), hydroregion(s), state(s), or county(ies).

Usage

```
sc_get_data(
  comid = NULL,
  metric = NULL,
  aoi = NULL,
  showAreaSqKm = NULL,
  showPctFull = NULL,
  state = NULL,
  county = NULL,
  region = NULL,
  conus = NULL,
  countOnly = NULL
)
```

Arguments

comid	Return metric information for specific COMIDs. Can be a comma-delimited list, a character vector, or any object that can be coerced to a comma-delimited list with paste. One of comid, county, state, or region is required unless conus='true'. Syntax: comid=<comid1>,<comid2>
metric	Name(s) of metrics to query. Must be character string with comma-delimited list of metrics, or, if metric='all' then all metrics will be queried. **Not** *case-sensitive*. Syntax: name=<name1>,<name2>
aoi	Name(s) of areas of interest to query. If a metric does not have data for a given AOI, no data is returned for that AOI. Certain metrics that have no AOI specified for StreamCat need the AOI to be specified as 'other'. These metrics include: BankfullDepth, BankfullWidth, ThalwagDepth (sic), CHEM_V2_1, CONN, HABT, HYD, ICI, IWI, TEMP, WettedWidth, prg_bmmi, and all the mast, msst, mwst metrics. *Case-sensitive*. Syntax: areaOfInterest=<value1>,<value2> Values: cat|ws|catrp100|wsrp100|other
showAreaSqKm	Return the area in square kilometers of a given area of interest. The default value is false. Values: true|false
showPctFull	Return the pctfull for each dataset. The default value is false. Values: true|false
state	Return metric information for COMIDs within a specific state. Use a state's abbreviation to query for a given state. One of comid, county, state, or region is required unless conus='true'. If specified *and valid*, comid and county are ignored. *Case-sensitive*. Syntax: state=<state1>,<state2>
county	Return metric information for COMIDs within a specific county. Users must use the FIPS code, not county name, as a way to disambiguate counties. One of comid, county, state, or region is required unless conus='true'. If specified *and valid*, comid is ignored. Syntax: county=<county1>,<county1>
region	Return metric information for COMIDs within a specified hydroregion. Hydroregions are specified using full name i.e. 'Region01', 'Region03N', 'Region10L' One of comid, county, state, or region is required unless conus='true'. If specified *and valid*, comid, county, and state are ignored. *Case-sensitive*. Syntax: region=<regionid1>,<regionid2>
conus	Return all COMIDs in the conterminous United States. Character string (**Not** *case-sensitive*) or logical. The default value is false. If true, comid, county, state, and region are ignored. Values: true|false
countOnly	Return a CSV containing only the row count (ROWCOUNT) and the column count (COLUMNCOUNT) that the server expects to return in a request. The default value is false. Values: true|false

Value

A data frame of StreamCat metrics. If data are missing for all rows of a given metric, then the column for that metric will not exist. If data are missing for only some rows, then they will be specified with NA.

Author(s)

Marc Weber

Examples

```
## Not run:
df <- sc_get_data(comid='179', aoi='cat', metric='fert')

df <- sc_get_data(metric='pctgrs2006', aoi='ws', region='Region01')

df <- sc_get_data(metric='pctwdwet2006', aoi='ws', county='41003')

df <- sc_get_data(metric='pcturbmd2006', aoi='wsrp100',
comid='1337420')

df <- sc_get_data(metric='pcturbmd2006,damdens',
aoi='cat,ws', comid='179,1337,1337420')

df <- sc_get_data(metric='pcturbmd2006,damdens',
aoi='cat,ws', comid='179,1337,1337420',
showAreaSqKm='true', showPctFull='true')

df <- sc_get_data(metric='pcturbmd2006,damdens',
aoi='cat,ws', comid='179,1337,1337420', countOnly='true')

df <- sc_get_data(metric='thalwagdepth', comid='179,1337,1337420', aoi='other')

df <- sc_get_data(metric='thalwagdepth', comid=c('179','1337','1337420'), aoi='other')

df <- sc_get_data(comid='179', aoi='ws', metric='all')

## End(Not run)
```

`sc_get_metric_names` *Get StreamCat Metric Names*

Description

Function to filter StreamCat metrics metrics by category, area of interest, dataset or year. Use ‘sc_get_params(categories)‘ or ‘sc_get_params(datasets)‘ to see all the valid category or dataset options

Usage

```
sc_get_metric_names(category = NULL, aoi = NULL, year = NULL, dataset = NULL)
```

Arguments

`category`	Filter StreamCat metrics based on the metric category
`aoi`	Filter StreamCat metrics based on the area of interest
`year`	Filter StreamCat metrics based on a particular year or years
`dataset`	Filter StreamCat metrics based on the dataset name

Value

A dataframe of merics and description that match filter criteria

Author(s)

Marc Weber

Examples

```
## Not run:
metrics <- sc_get_metric_names(category='Wildfire')
metrics <- sc_get_metric_names(category = c('Deposition','Climate'),
aoi=c('Cat','Ws'))
metrics <- sc_get_metric_names(aoi='Other',
dataset=c('Canal Density','Predicted Channel Widths Depths'))


## End(Not run)
```

`sc_get_nni` *Get NNI*

Description

Function to get all NNI data available for a given year.

Usage

```
sc_get_nni(
  year,
  aoi = NULL,
  comid = NULL,
  showAreaSqKm = TRUE,
  state = NULL,
  county = NULL,
  region = NULL,
  conus = NULL,
  showPctFull = NULL,
  countOnly = NULL
)
```

Arguments

`year`	Years(s) of NNI metrics to query. Only valid NNI years are accepted (1987:2017) Syntax: year=<year1>,<year2>
`aoi`	Specify the area of interest described by a metric. By default, all available areas of interest for a given metric are returned. Syntax: areaOfInterest=<value1>,<value2> Values: catchment|watershed

comid	Return metric information for specific COMIDs Syntax: comid=<comid1>,<comid2>
showAreaSqKm	Return the area in square kilometers of a given area of interest. The default value is true. Values: true|false
state	Return metric information for COMIDs within a specific state. Use a state's abbreviation to query for a given state. Syntax: state=<state1>,<state2>
county	Return metric information for COMIDs within a specific county. Users must use the FIPS code, not county name, as a way to disambiguate counties. Syntax: county=<county1>,<county1>
region	Return metric information for COMIDs within a specified hydroregion. Syntax: region=<regionid1>,<regionid2>
conus	Return all COMIDs in the conterminous United States. The default value is false. Values: true|false
showPctFull	Return the pctfull for each dataset. The default value is false. Values: true|false
countOnly	Return a CSV containing only the row count (ROWCOUNT) and the column count (COLUMNCOUNT) that the server expects to return in a request. The default value is false. Values: true|false

Value

A tibble of desired StreamCat metrics

Author(s)

Selia Markley

Examples

```
## Not run:

df <- sc_get_nni(year='1987, 1990, 2005, 2017', aoi='cat,ws',
comid='179,1337,1337420')

df <- sc_get_nni(year='2015', aoi='cat',
comid='179', countOnly=TRUE)

df <- sc_get_nni(comid='179', year='2011, 2012', aoi='ws')

df <- sc_get_nni(year='2015, 2016, 2017', county='41003', aoi='ws')

## End(Not run)
```

sc_get_params *Get StreamCat Parameters*

Description

Function to return available StreamCat parameters using the StreamCat API.

Usage

```
sc_get_params(param = NULL)
```

Arguments

param	List of available parameters in the API for the following options: name, areaofInterest, region, state, county. State and county return a data frame that includes FIPS codes, names and state abbreviations Syntax: param=<value1>,<value2> Values: name|area

Value

A list of all the current StreamCat values for a given parameter

Author(s)

Marc Weber

Examples

```
## Not run:
params <- sc_get_params(param='variable_info')
params <- sc_get_params(param='metric_names')
params <- sc_get_params(param='categories')
params <- sc_get_params(param='aoi')
params <- sc_get_params(param='state')
params <- sc_get_params(param='county')
params <- sc_get_params(param='datasets')
## End(Not run)
```

sc_plotnni *Plot National Nutrient Inventory data for streams*

Description

Function to plot time series of nitrogen and phosphorus budgets for a given stream COMID. This function allows a user to return a time series of major inputs, outputs, and derived metrics of nitrogen and phosphorus. Plot is returned as an object

Usage

```
sc_plotnni(comid, include.nue = FALSE, include.inset = TRUE)
```

Arguments

comid	Identifier of stream COMID user wants to plot NNI data for. Must be a character string with the COMID digit. Syntax: com=<COMID>
include.nue	Include time series of nitrogen use efficiency in the returned plot. The default value is false. Values: true|false
include.inset	Include inset map that shows the location of the COMID and its basin. The default value is true. Values: true|false

Value

Return plot as an object.

Author(s)

Selia Markley

Examples

```
## Not run:
p <- sc_plotnni(comid='1337420')
p <- sc_plotnni(comid='1337420', include.nue=TRUE)
p <- sc_plotnni(comid='1337420', include.inset=FALSE)

## End(Not run)
```

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