

Package ‘rnpn’

April 21, 2022

Title Interface to the National 'Phenology' Network 'API'

Description Programmatic interface to the Web Service methods provided by the National 'Phenology' Network (<<https://usanpn.org/>>), which includes data on various life history events that occur at specific times.

Version 1.2.5

License MIT + file LICENSE

Depends R (>= 3.5.0)

Imports htr (>= 1.1.0), jsonlite (>= 0.9.19), data.table (>= 1.9.6), sp (>= 1.1-0), tibble, curl, raster, rgdal, plyr, XML, magrittr

Suggests ggplot2, testthat, covr, knitr, markdown, rmarkdown, RColorBrewer, vcr

RoxygenNote 7.1.2

VignetteBuilder knitr

URL <https://github.com/usa-npn/rnpn/> (devel)

NeedsCompilation no

Author Alyssa Rosemartin [aut, cre],
Scott Chamberlain [aut],
Lee Marsh [aut],
Kevin Wong [aut],
David LeBauer [ctb]

Maintainer Alyssa Rosemartin <alyssa@usanpn.org>

Repository CRAN

Date/Publication 2022-04-20 22:30:02 UTC

R topics documented:

rnpn-package	2
check_geo_service	3
check_service	3
rnpn_abundance_categories	3

nnp_datasets	4
nnp_download_geospatial	4
nnp_download_individual_phenometrics	5
nnp_download_magnitude_phenometrics	9
nnp_download_site_phenometrics	12
nnp_download_status_data	15
nnp_get_agdd_point_data	18
nnp_get_custom_agdd_raster	19
nnp_get_custom_agdd_time_series	20
nnp_get_layer_details	21
nnp_get_phenophases_for_taxon	22
nnp_get_point_data	23
nnp_groups	24
nnp_lookup_names	24
nnp_phenophases	25
nnp_phenophases_by_species	25
nnp_phenophase_definitions	26
nnp_phenophase_details	26
nnp_pheno_classes	27
nnp_set_env	27
nnp_species	28
nnp_species_types	29
nnp_stations	30
nnp_stations_by_location	30
nnp_stations_by_state	31
nnp_stations_with_spp	32
rnpn-defunct	32
Index	33

 rnpn-package

Interface to the National Phenology Network API

Description

This package allows for easy access to the National Phenology Network's Data API. To learn more, take a look at the vignettes.

check_geo_service	<i>Runs a basic check to see if a valid response is returned by Geoserver and returns TRUE/FALSE</i>
-------------------	--

Description

Used in unit tests to determine if tests should be run

Usage

```
check_geo_service()
```

check_service	<i>Runs a basic check to see if a valid response is returned by the NPN Portal service and returns TRUE/FALSE</i>
---------------	---

Description

Used in unit tests to determine if tests should be run

Usage

```
check_service()
```

npn_abundance_categories	<i>Get Abundance Categories</i>
--------------------------	---------------------------------

Description

Gets data on all abundance/intensity categories and includes a data frame of applicable abundance/intensity values for each category

Usage

```
npn_abundance_categories(...)
```

Arguments

... Curl options passed on to [GET](#)

Value

A data frame listing all abundance/intensity categories and their corresponding values.

`nnp_datasets`*Get Datasets*

Description

Returns a complete list of information about all datasets integrated into the NPN dataset. Data can then be pulled for individual datasets using their unique IDs.

Usage

```
nnp_datasets(...)
```

Arguments

```
...           Curl options passed on to GET
```

Value

data.frame of datasets and their IDs.

Examples

```
## Not run:  
nnp_datasets()  
  
## End(Not run)
```

`nnp_download_geospatial`*Download Geospatial Data*

Description

Function for directly downloading any arbitrary Geospatial layer data from the NPN Geospatial web services.

Usage

```
nnp_download_geospatial(  
  coverage_id,  
  date,  
  format = "geotiff",  
  output_path = NULL  
)
```

Arguments

coverage_id	The coverage id (machine name) of the layer for which to retrieve. Applicable values can be found via the <code>nbn_get_layer_details()</code> function under the 'name' column.
date	Specify the date param for the layer retrieved. This can be a calendar date formatted YYYY-mm-dd or it could be a string integer representing day of year. It can also be NULL in some cases. Which to use depends entirely on the layer being requested. More information available from the <code>nbn_get_layer_details()</code> function.
format	The output format of the raster layer retrieved. Defaults to GeoTIFF.
output_path	Optional value. When set, the raster will be piped to the file path specified. When left unset, this function will return a raster object.

Details

Information about the layers can also be viewed at the `getCapabilities` page directly: <https://geoserver.usanpn.org/geoserver/wms>

Value

Raster object meeting the `coverage_id`, `date` and `format` parameters specified.

Examples

```
## Not run:  
ras<-nbn_download_geospatial("si-x:30yr_avg_six_bloom","255")  
  
## End(Not run)
```

nbn_download_individual_phenometrics

Download Individual Phenometrics

Description

This function allows for a parameterized search of all individual phenometrics records in the USA-NPN database, returning all records as per the search parameters in a data table. Data fetched from NPN services is returned as raw JSON before being channeled into a data table. Optionally results can be directed to an output file in which case raw JSON is converted to CSV and saved to file; in that case, data is also streamed to file which allows for more easily handling of the data if the search otherwise returns more data than can be handled at once in memory.

Usage

```
npn_download_individual_phenometrics(
  request_source,
  years,
  coords = NULL,
  individual_ids = NULL,
  species_ids = NULL,
  station_ids = NULL,
  species_types = NULL,
  network_ids = NULL,
  states = NULL,
  phenophase_ids = NULL,
  functional_types = NULL,
  additional_fields = NULL,
  climate_data = FALSE,
  ip_address = NULL,
  dataset_ids = NULL,
  genus_ids = NULL,
  family_ids = NULL,
  order_ids = NULL,
  class_ids = NULL,
  pheno_class_ids = NULL,
  email = NULL,
  download_path = NULL,
  six_leaf_layer = FALSE,
  six_bloom_layer = FALSE,
  agdd_layer = NULL,
  six_sub_model = NULL,
  additional_layers = NULL,
  wkt = NULL
)
```

Arguments

<code>request_source</code>	Required field, string. Self-identify who is making requests to the data service
<code>years</code>	Required field, list of strings. Specify the years to include in the search, e.g. <code>c('2013','2014')</code> . You must specify at least one year.
<code>coords</code>	List of float values, used to specify a bounding box as a search parameter, e.g. <code>c(lower_left_lat, lower_left_long, upper_right_lat, upper_right_long)</code>
<code>individual_ids</code>	Comma-separated string of unique IDs for individual plants/animal species by which to filter the data
<code>species_ids</code>	List of unique IDs for searching based on species, e.g. <code>c(3, 34, 35)</code>
<code>station_ids</code>	List of unique IDs for searching based on site location, e.g. <code>c(5, 9, ...)</code>
<code>species_types</code>	List of unique species type names for searching based on species types, e.g. <code>c("Deciduous", "Evergreen")</code>
<code>network_ids</code>	List of unique IDs for searching based on partner group/network, e.g. <code>c(500, 300, ...)</code>

states	List of US postal states to be used as search params, e.g. c ("AZ", "IL")
phenophase_ids	List of unique IDs for searching based on phenophase, e.g. c (323, 324, ...)
functional_types	List of unique functional type names, e.g. c ("Birds")
additional_fields	List of additional fields to be included in the search results, e.g. c ("Station_Name", "Plant_Nickname")
climate_data	Boolean value indicating that all climate variables should be included in additional_fields.
ip_address	Optional field, string. IP Address of user requesting data. Used for generating data reports
dataset_ids	List of unique IDs for searching based on dataset, e.g. NEON or GRSM c(17,15)
genus_ids	List of unique IDs for searching based on taxonomic family, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids is also set.
family_ids	List of unique IDs for searching based on taxonomic family, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids is also set.
order_ids	List of unique IDs for searching based on taxonomic order, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids or family_ids are also set.
class_ids	List of unique IDs for searching based on taxonomic class, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids, family_ids or order_ids are also set.
pheno_class_ids	List of unique IDs for searching based on pheno class. Note that if both pheno_class_id and phenophase_id are provided in the same request, phenophase_id will be ignored.
email	Optional field, string. Email of user requesting data.
download_path	Optional file path to which search results should be re-directed for later use.
six_leaf_layer	Boolean value when set to true will attempt to resolve the date of the observation to a spring index, leafing value for the location at which the observations was taken
six_bloom_layer	Boolean value when set to true will attempt to resolve the date of the observation to a spring index, bloom value for the location at which the observations was taken
agdd_layer	numeric value, accepts 32 or 50. When set, the results will attempt to resolve the date of the observation to an AGDD value for the location; the 32 or 50 represents the base value of the AGDD value returned. All AGDD values are based on a January 1st start date of the year in which the observation was taken.
six_sub_model	Affects the results of the six layers returned. Can be used to specify one of three submodels used to calculate the spring index values. Thus setting this field will change the results of six_leaf_layer and six_bloom_layer. Valid values include: 'lilac', 'zabelli' and 'arnoldred'. For more information see the NPN's Spring Index Maps documentation: https://www.usanpn.org/data/spring_indices

<code>additional_layers</code>	Data frame with first column named 'name' and containing the names of the layer for which to retrieve data and the second column named 'param' and containing string representations of the time/elevation subset parameter to use. This variable can be used to append additional geospatial layer data fields to the results, such that the date of observation in each row will resolve to a value from the specified layers, given the location of the observation.
<code>wkt</code>	WKT geometry by which filter data. Specifying a valid WKT within the contiguous US will filter data based on the locations which fall within that WKT.

Details

This data type includes estimates of the dates of phenophase onsets and ends for individual plants and for animal species at a site during a user-defined time period. Each row represents a series of consecutive "yes" phenophase status records, beginning with the date of the first "yes" and ending with the date of the last "yes", submitted for a given phenophase on a given organism. Note that more than one consecutive series for an organism may be present within a single growing season or year.

Most search parameters are optional, however, users are encouraged to supply additional search parameters to get results that are easier to work with. `Request_Source` must be provided. This is a self-identifying string, telling the service who is asking for the data or from where the request is being made. It is recommended you provide your name or organization name. If the call to this function is acting as an intermediary for a client, then you may also optionally provide a user email and/or IP address for usage data reporting later.

Additional fields provides the ability to specify additional, non-critical fields to include in the search results. A complete list of additional fields can be found in the NPN service's companion documentation <https://docs.google.com/document/d/1yNjupricKOAXn6tY1sI7-EwkcfdGUZ7lxYv7fcPjO8/edit#heading=h.7yy4i3>. Metadata on all fields can be found in the following Excel sheet: http://www.usanpn.org/files/metadata/individual_phenometri

Value

Data table of all status records returned as per the search parameters. Null if output directed to file.

Examples

```
## Not run:
#Download all saguaro data for 2013 and 2014
npn_download_individual_phenometrics(
  request_source="Your Name or Org Here",
  years=c('2013', '2014'),
  species_id=c(210),
  download_path="saguaro_data_2013_2014.json"
)

## End(Not run)
```

`nbn_download_magnitude_phenometrics`*Download Magnitude Phenometrics*

Description

This function allows for a parameterized search of all magnitude phenometrics in the USA-NPN database, returning all records as per the search results in a data table. Data fetched from NPN services is returned as raw JSON before being channeled into a data table. Optionally results can be directed to an output file in which case raw JSON is saved to file; in that case, data is also streamed to file which allows for more easily handling of the data if the search otherwise returns more data than can be handled at once in memory.

Usage

```
nbn_download_magnitude_phenometrics(  
  request_source,  
  years,  
  period_frequency = "30",  
  coords = NULL,  
  species_ids = NULL,  
  genus_ids = NULL,  
  family_ids = NULL,  
  order_ids = NULL,  
  class_ids = NULL,  
  pheno_class_ids = NULL,  
  station_ids = NULL,  
  species_types = NULL,  
  network_ids = NULL,  
  states = NULL,  
  phenophase_ids = NULL,  
  functional_types = NULL,  
  additional_fields = NULL,  
  climate_data = FALSE,  
  ip_address = NULL,  
  dataset_ids = NULL,  
  email = NULL,  
  download_path = NULL,  
  taxonomy_aggregate = NULL,  
  pheno_class_aggregate = NULL,  
  wkt = NULL  
)
```

Arguments

`request_source` Required field, string. Self-identify who is making requests to the data service

years	Required field, list of strings. Specify the years to include in the search, e.g. c('2013','2014'). You must specify at least one year.
period_frequency	Required field, integer. The integer value specifies the number of days by which to delineate the period of time specified by the start_date and end_date, i.e. a value of 7 will delineate the period of time weekly. Any remainder days are grouped into the final delineation. This parameter, while typically an int, also allows for a "special" string value, "months" to be passed in. Specifying this parameter as "months" will delineate the period of time by the calendar months regardless of how many days are in each month. Defaults to 30 if omitted.
coords	List of float values, used to specify a bounding box as a search parameter, e.g. c (lower_left_lat, lower_left_long, upper_right_lat, upper_right_long)
species_ids	List of unique IDs for searching based on species, e.g. c (3, 34, 35)
genus_ids	List of unique IDs for searching based on taxonomic family, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids is also set.
family_ids	List of unique IDs for searching based on taxonomic family, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids is also set.
order_ids	List of unique IDs for searching based on taxonomic order, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids or family_ids are also set.
class_ids	List of unique IDs for searching based on taxonomic class, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids, family_ids or order_ids are also set.
pheno_class_ids	List of unique IDs for searching based on pheno class id, e.g. c (1, 5, 13)
station_ids	List of unique IDs for searching based on site location, e.g. c (5, 9, ...)
species_types	List of unique species type names for searching based on species types, e.g. c ("Deciduous", "Evergreen")
network_ids	List of unique IDs for searching based on partner group/network, e.g. (500, 300, ...)
states	List of US postal states to be used as search params, e.g. c ("AZ", "IL")
phenophase_ids	List of unique IDs for searching based on phenophase, e.g. c (323, 324, ...)
functional_types	List of unique functional type names, e.g. c ("Birds")
additional_fields	List of additional fields to be included in the search results, e.g. ("Station_Name", "Plant_Nickname")
climate_data	Boolean value indicating that all climate variables should be included in additional_fields
ip_address	Optional field, string. IP Address of user requesting data. Used for generating data reports
dataset_ids	List of unique IDs for searching based on dataset, e.g. NEON or GRSM c(17,15)
email	Optional field, string. Email of user requesting data.
download_path	Optional file path to which search results should be re-directed for later use.

taxonomy_aggregate	Boolean value indicating whether to aggregate data by a taxonomic order higher than species. This will be based on the values set in family_ids, order_ids, or class_ids. If one of those three fields are not set, then this value is ignored.
pheno_class_aggregate	Boolean value indicating whether to aggregate data by the pheno class ids as per the pheno_class_ids parameter. If the pheno_class_ids value is not set, then this parameter is ignored. This can be used in conjunction with taxonomy_aggregate and higher taxonomic level data filtering.
wkt	WKT geometry by which filter data. Specifying a valid WKT within the contiguous US will filter data based on the locations which fall within that WKT.

Details

This data type includes various measures of the extent to which a phenophase for a plant or animal species is expressed across multiple individuals and sites over a user-selected set of time intervals. Each row provides up to eight calculated measures summarized weekly, bi-weekly, monthly or over a custom time interval. These measures include approaches to evaluate the shape of an annual activity curve, including the total number of "yes" records and the proportion of "yes" records relative to the total number of status records over the course of a calendar year for a region of interest. They also include several approaches for standardizing animal abundances by observer effort over time and space (e.g. mean active bird individuals per hour). See the Metadata window for more information.

Most search parameters are optional, however, failing to provide even a single search parameter will return all results in the database. Request_Source must be provided. This is a self-identifying string, telling the service who is asking for the data or from where the request is being made. It is recommended you provide your name or organization name. If the call to this function is acting as an intermediary for a client, then you may also optionally provide a user email and/or IP address for usage data reporting later.

Additional fields provides the ability to specify more, non-critical fields to include in the search results. A complete list of additional fields can be found in the NPN service's companion documentation <https://docs.google.com/document/d/1yNjupricKOAXn6tY1sI7-EwkcfdwGUZ7lxYv7fcPjO8/edit#heading=h.df3zspop> Metadata on all fields can be found in the following Excel sheet: http://www.usanpn.org/files/metadata/magnitude_phenometr

Value

Data table of all status records returned as per the search parameters. Null if output directed to file.

Examples

```
## Not run:
#Download book all saguaro data for 2013
nbn_download_magnitude_phenometrics(
  request_source="Your Name or Org Here",
  years=c(2013),
  species_id=c(210),
  download_path="saguaro_data_2013.json"
)
```

```
## End(Not run)
```

```
npn_download_site_phenometrics
      Download Site Phenometrics
```

Description

This function allows for a parameterized search of all site phenometrics records in the USA-NPN database, returning all records as per the search parameters in a data table. Data fetched from NPN services is returned as raw JSON before being channeled into a data table. Optionally results can be directed to an output file in which case raw JSON is converted to CSV and saved to file; in that case, data is also streamed to file which allows for more easily handling of the data if the search otherwise returns more data than can be handled at once in memory.

Usage

```
npn_download_site_phenometrics(
  request_source,
  years,
  num_days_quality_filter = "30",
  coords = NULL,
  species_ids = NULL,
  genus_ids = NULL,
  family_ids = NULL,
  order_ids = NULL,
  class_ids = NULL,
  pheno_class_ids = NULL,
  station_ids = NULL,
  species_types = NULL,
  network_ids = NULL,
  states = NULL,
  phenophase_ids = NULL,
  functional_types = NULL,
  additional_fields = NULL,
  climate_data = FALSE,
  ip_address = NULL,
  dataset_ids = NULL,
  email = NULL,
  download_path = NULL,
  six_leaf_layer = FALSE,
  six_bloom_layer = FALSE,
  agdd_layer = NULL,
  six_sub_model = NULL,
  additional_layers = NULL,
  taxonomy_aggregate = NULL,
  pheno_class_aggregate = NULL,
```

```

    wkt = NULL
  )

```

Arguments

request_source	Required field, string. Self-identify who is making requests to the data service
years	Required field, list of strings. Specify the years to include in the search, e.g. c('2013','2014'). You must specify at least one year.
num_days_quality_filter	Required field, defaults to 30. The integer value sets the upper limit on the number of days difference between the first Y value and the previous N value for each individual to be included in the data aggregation.
coords	List of float values, used to specify a bounding box as a search parameter, e.g. c (lower_left_lat, lower_left_long, upper_right_lat, upper_right_long)
species_ids	List of unique IDs for searching based on species, e.g. c (3, 34, 35)
genus_ids	List of unique IDs for searching based on taxonomic family, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids is also set.
family_ids	List of unique IDs for searching based on taxonomic family, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids is also set.
order_ids	List of unique IDs for searching based on taxonomic order, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids or family_ids are also set.
class_ids	List of unique IDs for searching based on taxonomic class, e.g. c (3, 34, 35) . This parameter will take precedence if species_ids, family_ids or order_ids are also set.
pheno_class_ids	List of unique IDs for searching based on pheno class id, e.g. c (1, 5, 13)
station_ids	List of unique IDs for searching based on site location, e.g. c (5, 9, ...)
species_types	List of unique species type names for searching based on species types, e.g. c ("Deciduous", "Evergreen")
network_ids	List of unique IDs for searching based on partner group/network, e.g. (500, 300, ...)
states	List of US postal states to be used as search params, e.g. c ("AZ", "IL")
phenophase_ids	List of unique IDs for searching based on phenophase, e.g. c (323, 324, ...)
functional_types	List of unique functional type names, e.g. c ("Birds")
additional_fields	List of additional fields to be included in the search results, e.g. ("Station_Name", "Plant_Nickname")
climate_data	Boolean value indicating that all climate variables should be included in additional_fields
ip_address	Optional field, string. IP Address of user requesting data. Used for generating data reports
dataset_ids	List of unique IDs for searching based on dataset, e.g. NEON or GRSM c(17,15)

email	Optional field, string. Email of user requesting data.
download_path	Optional file path to which search results should be re-directed for later use.
six_leaf_layer	Boolean value when set to true will attempt to resolve the date of the observation to a spring index, leafing value for the location at which the observations was taken
six_bloom_layer	Boolean value when set to true will attempt to resolve the date of the observation to a spring index, bloom value for the location at which the observations was taken
agdd_layer	numeric value, accepts 32 or 50. When set, the results will attempt to resolve the date of the observation to an AGDD value for the location; the 32 or 50 represents the base value of the AGDD value returned. All AGDD values are based on a January 1st start date of the year in which the observation was taken.
six_sub_model	Affects the results of the six layers returned. Can be used to specify one of three submodels used to calculate the spring index values. Thus setting this field will change the results of six_leaf_layer and six_bloom_layer. Valid values include: 'lilac', 'zabelli' and 'arnoldred'. For more information see the NPN's Spring Index Maps documentation: https://www.usanpn.org/data/spring_indices
additional_layers	Data frame with first column named 'name' and containing the names of the layer for which to retrieve data and the second column named 'param' and containing string representations of the time/elevation subset parameter to use. This variable can be used to append additional geospatial layer data fields to the results, such that the date of observation in each row will resolve to a value from the specified layers, given the location of the observation.
taxonomy_aggregate	Boolean value indicating whether to aggregate data by a taxonomic order higher than species. This will be based on the values set in family_ids, order_ids, or class_ids. If one of those three fields are not set, then this value is ignored.
pheno_class_aggregate	Boolean value indicating whether to aggregate data by the pheno class ids as per the pheno_class_ids parameter. If the pheno_class_ids value is not set, then this parameter is ignored. This can be used in conjunction with taxonomy_aggregate and higher taxonomic level data filtering.
wkt	WKT geometry by which filter data. Specifying a valid WKT within the contiguous US will filter data based on the locations which fall within that WKT.

Details

This data type includes estimates of the overall onset and end of phenophase activity for plant and animal species at a site over a user-defined time period. Each row provides the first and last occurrences of a given phenophase on a given species, beginning with the date of the first observed "yes" phenophase status record and ending with the date of the last observed "yes" record of the user-defined time period. For plant species where multiple individuals are monitored at the site, the date provided for "first yes" is the mean of the first "yes" records for each individual plant at the site, and the date for "last yes" is the mean of the last "yes" records. Note that a phenophase may

have ended and restarted during the overall period of its activity at the site. These more fine-scale patterns can be explored in the individual phenometrics data.

Most search parameters are optional, however, users are encouraged to supply additional search parameters to get results that are easier to work with. Request_Source must be provided. This is a self-identifying string, telling the service who is asking for the data or from where the request is being made. It is recommended you provide your name or organization name. If the call to this function is acting as an intermediary for a client, then you may also optionally provide a user email and/or IP address for usage data reporting later.

Additional fields provides the ability to specify additional, non-critical fields to include in the search results. A complete list of additional fields can be found in the NPN service's companion documentation <https://docs.google.com/document/d/1yNjupricKOAXn6tY1sI7-EwkcfwdGUZ7lxYv7fcPjO8/edit#heading=h.ueaxz>. Metadata on all fields can be found in the following Excel sheet: http://www.usanpn.org/files/metadata/site_phenometrics_data

Value

Data table of all status records returned as per the search parameters. Null if output directed to file.

Examples

```
## Not run:
#Download all saguaro data for 2013 and 2014
npn_download_site_phenometrics(
  request_source="Your Name or Org Here",
  years=c('2013', '2014'),
  species_id=c(210),
  download_path="saguaro_data_2013_2014.json"
)

## End(Not run)
```

npn_download_status_data

Download Status and Intensity Records

Description

This function allows for a parameterized search of all status records in the USA-NPN database, returning all records as per the search parameters in a data table. Data fetched from NPN services is returned as raw JSON before being channeled into a data table. Optionally results can be directed to an output file in which case the raw JSON is converted to CSV and saved to file; in that case, data is also streamed to file which allows for more easily handling of the data if the search otherwise returns more data than can be handled at once in memory.

Usage

```

nbn_download_status_data(
  request_source,
  years,
  coords = NULL,
  species_ids = NULL,
  genus_ids = NULL,
  family_ids = NULL,
  order_ids = NULL,
  class_ids = NULL,
  station_ids = NULL,
  species_types = NULL,
  network_ids = NULL,
  states = NULL,
  phenophase_ids = NULL,
  functional_types = NULL,
  additional_fields = NULL,
  climate_data = FALSE,
  ip_address = NULL,
  dataset_ids = NULL,
  email = NULL,
  download_path = NULL,
  six_leaf_layer = FALSE,
  six_bloom_layer = FALSE,
  agdd_layer = NULL,
  six_sub_model = NULL,
  additional_layers = NULL,
  pheno_class_ids = NULL,
  wkt = NULL
)

```

Arguments

<code>request_source</code>	Required field, string. Self-identify who is making requests to the data service
<code>years</code>	Required field, list of strings. Specify the years to include in the search, e.g. <code>c('2013','2014')</code> . You must specify at least one year.
<code>coords</code>	List of float values, used to specify a bounding box as a search parameter, e.g. <code>c(lower_left_lat, lower_left_long, upper_right_lat, upper_right_long)</code>
<code>species_ids</code>	List of unique IDs for searching based on species, e.g. <code>c(3, 34, 35)</code>
<code>genus_ids</code>	List of unique IDs for searching based on taxonomic family, e.g. <code>c(3, 34, 35)</code> . This parameter will take precedence if <code>species_ids</code> is also set.
<code>family_ids</code>	List of unique IDs for searching based on taxonomic family, e.g. <code>c(3, 34, 35)</code> . This parameter will take precedence if <code>species_ids</code> is also set.
<code>order_ids</code>	List of unique IDs for searching based on taxonomic order, e.g. <code>c(3, 34, 35)</code> . This parameter will take precedence if <code>species_ids</code> or <code>family_ids</code> are also set.

class_ids	List of unique IDs for searching based on taxonomic class, e.g. c (3, 34, 35). This parameter will take precedence if species_ids, family_ids or order_ids are also set.
station_ids	List of unique IDs for searching based on site location, e.g. c (5, 9, ...)
species_types	List of unique species type names for searching based on species types, e.g. c ("Deciduous", "Evergreen")
network_ids	List of unique IDs for searching based on partner group/network, e.g. (500, 300, ...)
states	List of US postal states to be used as search params, e.g. c ("AZ", "IL")
phenophase_ids	List of unique IDs for searching based on phenophase, e.g. c (323, 324, ...)
functional_types	List of unique functional type names, e.g. c ("Birds")
additional_fields	List of additional fields to be included in the search results, e.g. c("Station_Name", "Plant_Nickname")
climate_data	Boolean value indicating that all climate variables should be included in additional_fields
ip_address	Optional field, string. IP Address of user requesting data. Used for generating data reports
dataset_ids	List of unique IDs for searching based on dataset, e.g. NEON or GRSM c(17,15)
email	Optional field, string. Email of user requesting data.
download_path	Optional file path to which search results should be re-directed for later use.
six_leaf_layer	Boolean value when set to true will attempt to resolve the date of the observation to a spring index, leafing value for the location at which the observations was taken
six_bloom_layer	Boolean value when set to true will attempt to resolve the date of the observation to a spring index, bloom value for the location at which the observations was taken
agdd_layer	numeric value, accepts 32 or 50. When set, the results will attempt to resolve the date of the observation to an AGDD value for the location; the 32 or 50 represents the base value of the AGDD value returned. All AGDD values are based on a January 1st start date of the year in which the observation was taken.
six_sub_model	Affects the results of the six layers returned. Can be used to specify one of three submodels used to calculate the spring index values. Thus setting this field will change the results of six_leaf_layer and six_bloom_layer. Valid values include: 'lilac', 'zabelli' and 'arnoldred'. For more information see the NPN's Spring Index Maps documentation: https://www.usanpn.org/data/spring_indices
additional_layers	Data frame with first column named 'name' and containing the names of the layer for which to retrieve data and the second column named 'param' and containing string representations of the time/elevation subset parameter to use. This variable can be used to append additional geospatial layer data fields to the results, such that the date of observation in each row will resolve to a value from the specified layers, given the location of the observation.

pheno_class_ids	List of unique IDs for searching based on pheno class. Note that if both pheno_class_id and phenophase_id are provided in the same request, phenophase_id will be ignored.
wkt	WKT geometry by which filter data. Specifying a valid WKT within the contiguous US will filter data based on the locations which fall within that WKT.

Details

Most search parameters are optional, however, users are encouraged to supply additional search parameters to get results that are easier to work with. Request_Source must be provided. This is a self-identifying string, telling the service who is asking for the data or from where the request is being made. It is recommended you provide your name or organization name. If the call to this function is acting as an intermediary for a client, then you may also optionally provide a user email and/or IP address for usage data reporting later.

Additional fields provides the ability to specify more, non-critical fields to include in the search results. A complete list of additional fields can be found in the NPN service's companion documentation <https://docs.google.com/document/d/1yNjupricKOAXn6tY1sI7-EwkcfdGUZ7lxYv7fcPjO8/edit#heading=h.w0nctge>. Metadata on all fields can be found in the following Excel sheet: http://www.usanpn.org/files/metadata/status_intensity_datafi

Value

Data table of all status records returned as per the search parameters. Null if output directed to file.

Examples

```
## Not run:
#Download all saguaro data for 2016
npn_download_status_data(
  request_source="Your Name or Org Here",
  years=c(2016),
  species_id=c(210),
  download_path="saguaro_data_2016.json"
)

## End(Not run)
```

npn_get_agdd_point_data

Get AGDD Point Value

Description

This function is for requesting AGDD point values. Because the NPN has a separate data service that can provide AGDD values which is more accurate than Geoserver this function is ideal when requested AGDD point values.

Usage

```
npn_get_agdd_point_data(layer, lat, long, date, store_data = TRUE)
```

Arguments

layer	The name of the queried layer.
lat	The latitude of the queried point.
long	The longitude of the queried point.
date	The queried date.
store_data	Boolean value. If set TRUE then the value retrieved will be stored in a global variable named point_values for later use

Details

As this function only works for AGDD point values, if it's necessary to retrieve point values for other layers please try the npn_get_point_data function.

Value

Returns a numeric value of the AGDD value at the specified lat/long/date. If no value can be retrieved, then -9999 is returned.

```
npn_get_custom_agdd_raster
```

Get Custom AGDD Raster Map

Description

This function takes a series of variables used in calculating AGDD and returns a raster of the continental USA with each pixel representing the calculated AGDD value based on start and end date. This function leverages the USA-NPN geo web services.

Usage

```
npn_get_custom_agdd_raster(
  method,
  climate_data_source,
  temp_unit,
  start_date,
  end_date,
  base_temp,
  upper_threshold = NULL
)
```

Arguments

method	Takes "simple" or "double-sine" as input. This is the AGDD calculation method to use for each data point. Simple refers to simple averaging.
climate_data_source	Specified the climate data set to use. Takes either "PRISM" or "NCEP" as input.
temp_unit	The unit of temperature to use in the calculation. Takes either "Fahrenheit" or "Celsius" as input.
start_date	Date at which to begin the AGDD calculations.
end_date	Date at which to end the AGDD calculations.
base_temp	This is the lowest temperature for each day for it to be considered in the calculation.
upper_threshold	This parameter is only applicable for the double-sine method. This sets the highest temperature to be considered in any given day's AGDD calculation.

Value

A raster object of each calculated AGDD numeric values based on specified time period/method/base temp/data source.

npn_get_custom_agdd_time_series

Get Custom AGDD Time Series

Description

This function takes a series of variables used in calculating AGDD and returns an AGDD time series, based on start and end date, for a given location in the continental US. This function leverages the USA-NPN geo web services

Usage

```
npn_get_custom_agdd_time_series(
  method,
  start_date,
  end_date,
  base_temp,
  climate_data_source,
  temp_unit,
  lat,
  long,
  upper_threshold = NULL
)
```

Arguments

method	Takes "simple" or "double-sine" as input. This is the AGDD calculation method to use for each data point. Simple refers to simple averaging.
start_date	Date at which to begin the AGDD calculations
end_date	Date at which to end the AGDD calculations
base_temp	This is the lowest temperature for each day for it to be considered in the calculation.
climate_data_source	Specified the climate data set to use. Takes either "PRISM" or "NCEP" as input.
temp_unit	The unit of temperature to use in the calculation. Takes either "Fahrenheit" or "Celsius" as input.
lat	The latitude of the location for which to calculate the time series
long	The longitude of the location for which to calculate the time series
upper_threshold	This parameter is only applicable for the double-sine method. This sets the highest temperature to be considered in any given day's AGDD calculation

Value

A data frame containing the numeric AGDD values for each day for the specified time period/location/method/base temp/data source.

nnp_get_layer_details *Get Geospatial Data Layer Details*

Description

This function will return information about the various data layers available via the NPN's geospatial web services. Specifically, this function will query the NPN's GetCapabilities endpoint and parse the information on that page about the layers. For each layer, this function will retrieve the layer name (as to be specified elsewhere programmatically), the title (human readable), the abstract, which describes the data in the layer, the dimension name and dimension range for specifying specific date values from the layer.

Usage

```
nnp_get_layer_details()
```

Details

Information about the layers can also be viewed at the getCapabilities page directly: <https://geoserver.usanpn.org/geoserver/wms>

Value

Data frame containing all layer details as specified in function description.

Examples

```
## Not run:
layers <- npn_get_layer_details()

## End(Not run)
```

```
npn_get_phenophases_for_taxon
      Get Phenophases for Taxon
```

Description

This function gets a list of phenophases that are applicable for a provided taxonomic grouping, e.g. family, order. Note that since a higher taxonomic order will aggregate individual species not every phenophase returned through this function will be applicable for every species belonging to that taxonomic group.

Usage

```
npn_get_phenophases_for_taxon(
  family_ids = NULL,
  order_ids = NULL,
  class_ids = NULL,
  genus_ids = NULL,
  date = NULL,
  return_all = 0,
  ...
)
```

Arguments

family_ids	List of taxonomic family ids to search for.
order_ids	List of taxonomic order ids to search for.
class_ids	List of taxonomic class ids to search for
genus_ids	List of taxonomic genus ids to search for
date	Specify the date of interest. For this function to return anything, either this value must be set or return_all must be 1.
return_all	Takes either 0 or 1 as input and defaults to 0. For this function to return anything, either this value must be set to 1 or date must be set.
...	Curl options passed on to GET

Details

It's also important to note that phenophase definitions can change for individual species over time, so there's a need to specify either a date of interest, or to explicitly state that the function should return all phenophases that were ever applicable for any species belonging to the specified taxonomic group.

When called, this function requires of these three parameters, exactly one of family_ids, order_ids or class_ids to be set.

Value

A data frame listing phenophases in the NPN database for the specified taxon and date.

nnp_get_point_data	<i>Get Point Data Value</i>
--------------------	-----------------------------

Description

This function can get point data about any of the NPN geospatial layers.

Usage

```
nnp_get_point_data(layer, lat, long, date, store_data = TRUE)
```

Arguments

layer	The coverage id (machine name) of the layer for which to retrieve. Applicable values can be found via the nnp_get_layer_details() function under the 'name' column.
lat	The latitude of the point.
long	The longitude of the point.
date	The date for which to get a value.
store_data	Boolean value. If set TRUE then the value retrieved will be stored in a global variable named point_values for later use.

Details

Please note that this function pulls this from the NPN's WCS service so the data may not be totally precise. If you need precise AGDD values try using the nnp_get_agdd_point_data function.

Value

Returns a numeric value for any NPN geospatial data layer at the specified lat/long/date. If no value can be retrieved, then -9999 is returned.

nbn_groups	<i>Get Partner Groups</i>
------------	---------------------------

Description

Returns a list of all groups participating in the NPN's data collection program. These details can be used to further filter other service endpoints' results.

Usage

```
nbn_groups(use_hierarchy = FALSE, ...)
```

Arguments

use_hierarchy	Boolean indicating whether or not the list of networks should be represented in a hierarchy. Defaults to FALSE.
...	Curl options passed on to GET

Value

A data frame of partner groups, including ID and name.

nbn_lookup_names	<i>Species Name Lookup</i>
------------------	----------------------------

Description

Look up species IDs by taxonomic or common name

Usage

```
nbn_lookup_names(name, type = "genus", fuzzy = FALSE)
```

Arguments

name	A scientific or common name
type	One of common_name, genus, or species
fuzzy	One of TRUE or FALSE, if FALSE, uses fuzzy search via agrep, if TRUE, uses grep.

Value

A data frame with species ID numbers based on the name and type parameters.

Examples

```
## Not run:
nnp_lookup_names(name='Pinus', type='genus')
nnp_lookup_names(name='pine', type='common_name')
nnp_lookup_names(name='bird', type='common_name', fuzzy=TRUE)

## End(Not run)
```

nnp_phenophases	<i>Get Phenophases</i>
-----------------	------------------------

Description

Retrieves a complete list of all phenophases in the NPN database.

Usage

```
nnp_phenophases(...)
```

Arguments

... Curl options passed on to [GET](#)

Value

A data frame listing all phenophases available in the NPN database.

nnp_phenophases_by_species	<i>Get Phenophase for Species</i>
----------------------------	-----------------------------------

Description

Retrieves the phenophases applicable to species for a given date. It's important to specify a date since protocols/phenophases for any given species can change from year to year.

Usage

```
nnp_phenophases_by_species(species_ids, date, ...)
```

Arguments

species_ids List of species_ids for which to get phenophase information.
date The applicable date for which to retrieve phenophases for the given species.
... Curl options passed on to [GET](#)

Value

A data frame listing phenophases in the NPN database for the specified species and date.

```
npn_phenophase_definitions
      Get Phenophase Definitions
```

Description

Retrieves a complete list of all phenophase definitions.

Usage

```
npn_phenophase_definitions(...)
```

Arguments

```
...           Curl options passed on to GET
```

Value

A data frame listing all phenophases in the NPN database and their definitions.

```
npn_phenophase_details
      Get Phenophase Details
```

Description

Retrieves additional details for select phenophases, including full list of applicable phenophase definition IDs and phenophase revision notes over time

Usage

```
npn_phenophase_details(ids = list(), ...)
```

Arguments

```
ids           Takes a list of phenophase ids for which to retrieve additional details.
...           Curl options passed on to GET
```

Value

A data frame listing phenophases in the NPN database, including detailed information for each, filtered by the phenophase ID.

nnp_pheno_classes	<i>Get Pheno Classes</i>
-------------------	--------------------------

Description

Gets information about all pheno classes, which are a higher-level order of phenophases.

Usage

```
nnp_pheno_classes(...)
```

Arguments

... Curl options passed on to [GET](#)

Value

A data frame listing the pheno classes in the NPN database.

nnp_set_env	<i>Set Environment</i>
-------------	------------------------

Description

By default this library will call the NPN's production services but in some cases it's preferable to access the development web services so this function allows for manually setting the web service endpoints to use DEV instead. Just pass in "dev" to this function to change the endpoints to use.

Usage

```
nnp_set_env(env = "ops")
```

Arguments

env The environment to use. Should be "ops" or "dev"

nnp_species

Get Species

Description

Returns a complete list of all species information of species represented in the NPN database.

Returns information about a species based on the NPN's unique ID for that species

Search for species by state

Search NPN species information using a number of different parameters, which can be used in conjunction with one another, including: - Species on which a particular group or groups are actually collecting data - What species were observed in a given date range - What species were observed at a particular station or stations

Usage

```
nnp_species(...)

nnp_species_id(ids, ...)

nnp_species_state(state, kingdom = NULL, ...)

nnp_species_search(
  network = NULL,
  start_date = NULL,
  end_date = NULL,
  station_id = NULL,
  ...
)
```

Arguments

...	Curl options passed on to GET
ids	List of species ids for which to retrieve information
state	A US postal state code to filter results.
kingdom	Filters results by taxonomic kingdom. Takes either 'Animalia' or 'Plantae'.
network	filter species based on a list of unique identifiers of NPN groups that are actually observing data on the species. Takes a list of IDs
start_date	filter species by date observed. This sets the start date of the date range and must be used in conjunction with end_date
end_date	filter species by date observed. This sets the end date of the date range and must be used in conjunction with start_date
station_id	filter species by a list of unique site identifiers

Value

A data frame with information on species in the NPN database and their IDs.

A data frame with information on species in the NPN database and their IDs, filtered by the species ID parameter.

A data frame with information on species in the NPN database whose distribution includes a given state.

A data frame with information on species in the NPN database filtered by partner group, dates and station/site IDs.

Examples

```
## Not run:
nnp_species()
nnp_species_id(ids = 3)

## End(Not run)
## Not run:
nnp_species_state(state = "AZ")
nnp_species_state(state = "AZ", kingdom = "Plantae")

## End(Not run)
```

nnp_species_types	<i>Get Species Types</i>
-------------------	--------------------------

Description

Return all plant or animal functional types used in the NPN database.

Usage

```
nnp_species_types(kingdom = "Plantae", ...)
```

Arguments

kingdom	The kingdom for which to return functional types; either 'Animalia' or 'Plantae'. Defaults to Plantae.
...	Curl options passed on to GET

Value

A data frame with a list of the functional types used in the NPN database, filtered by the specified kingdom.

npn_stations	<i>Get Station Data</i>
--------------	-------------------------

Description

Get a list of all stations, optionally filtered by state

Usage

```
npn_stations(state_code = NULL, ...)
```

Arguments

state_code	The postal code of the US state by which to filter the results returned. Leave empty to get all stations.
...	Curl options passed on to GET

Value

A data frame with stations' latitude and longitude, names, and ids.

Examples

```
## Not run:
npn_stations()
npn_stations('AZ')

## End(Not run)
```

npn_stations_by_location	<i>Get station data based on a WKT defined geography.</i>
--------------------------	---

Description

Takes a Well-Known Text based geography as input and returns data for all stations, including unique IDs, within that boundary.

Usage

```
npn_stations_by_location(wkt, ...)
```

Arguments

wkt	Required field specifying the WKT geography to use.
...	Curl options passed on to GET

Value

A data frame listing stations filtered based on the WKT geography.

Examples

```
## Not run:
head( npr_stations_by_state(wkt="POLYGON((
-110.94484396954107 32.23623109416672,-110.96166678448247 32.23594069208043,
-110.95960684795904 32.21328646993733,-110.94244071026372 32.21343170728929,
-110.93935080547857 32.23216538049456,-110.94484396954107 32.23623109416672)))")
)

## End(Not run)
```

npr_stations_by_state *Get number of stations by state.*

Description

Get number of stations by state.

Usage

```
npr_stations_by_state(...)
```

Arguments

... [Curl options](#) passed on to [GET](#)

Value

A data frame listing stations by state.

Examples

```
## Not run:
head( npr_stations_by_state() )

## End(Not run)
```

nnp_stations_with_spp *Get Stations with Species*

Description

Get a list of all stations which have an individual whom is a member of a set of species.

Usage

```
nnp_stations_with_spp(speciesid, ...)
```

Arguments

speciesid	Required. Species id numbers, from 1 to infinity, potentially, use e.g., c(52, 53, etc.) if more than one species desired (numeric).
...	Curl options passed on to GET

Value

A data frame with stations' latitude and longitude, names, and ids.

Examples

```
## Not run:  
nnp_stations_with_spp(speciesid = c(52,53,54))  
nnp_stations_with_spp(speciesid = 53)  
  
## End(Not run)
```

rnpn-defunct

Defunct functions in rnpn

Description

- [nnp_obsspyday](#): Removed.
- [nnp_allobssp](#): Removed.
- [nnp_indspatstations](#): Removed.
- [nnp_indsatstations](#): Removed.
- [nnp_stationsbystate](#): Removed.
- [nnp_stationswithspp](#): Removed.

Index

- * **package**
 - rnpn-package, 2
- check_geo_service, 3
- check_service, 3
- GET, 3, 4, 22, 24–32
- npn_abundance_categories, 3
- npn_allobssp, 32
- npn_datasets, 4
- npn_download_geospatial, 4
- npn_download_individual_phenometrics, 5
- npn_download_magnitude_phenometrics, 9
- npn_download_site_phenometrics, 12
- npn_download_status_data, 15
- npn_get_agdd_point_data, 18
- npn_get_custom_agdd_raster, 19
- npn_get_custom_agdd_time_series, 20
- npn_get_layer_details, 21
- npn_get_phenophases_for_taxon, 22
- npn_get_point_data, 23
- npn_groups, 24
- npn_indsatstations, 32
- npn_indspatstations, 32
- npn_lookup_names, 24
- npn_obsspbyday, 32
- npn_pheno_classes, 27
- npn_phenophase_definitions, 26
- npn_phenophase_details, 26
- npn_phenophases, 25
- npn_phenophases_by_species, 25
- npn_set_env, 27
- npn_species, 28
- npn_species_id (npn_species), 28
- npn_species_search (npn_species), 28
- npn_species_state (npn_species), 28
- npn_species_types, 29
- npn_stations, 30
- npn_stations_by_location, 30
- npn_stations_by_state, 31
- npn_stations_with_spp, 32
- npn_stationsbystate, 32
- npn_stationswithspp, 32
- rnpn (rnpn-package), 2
- rnpn-defunct, 32
- rnpn-package, 2