Package 'TrackTrap'

October 29, 2026

Title Calculate and Visualize Degree-Days for Pest Monitoring

Version 1.1.0

Description Combines pest trap observations with daily temperatures to calculate and visualize cumulative degree-days. Temperature inputs include 'Daymet' <https://daymet.ornl.gov>, 'Open-Meteo' <https://open-meteo.com/>, reports from the California Irrigation Management Information System ('CIMIS') <https://cimis.water.ca.gov>, and user-supplied daily weather data. Degree-days are calculated using the simple-average method with either an upper threshold applied to the daily mean or an explicitly selected calculation without an upper cutoff. The first positive trap count defines the biofix for every pest, with accumulation beginning on the following day. Negative daily degree-day values are set to zero. Users can provide temperature thresholds and optional thermal reference values. Thermal reference markers and their multiples do not independently establish flight or generation identities. Complete daily calculations and weather provenance are retained with the output to support reproducibility.

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Encoding UTF-8

Depends R (>= 3.5.0)

LazyData true

Imports daymetr, dplyr, ggplot2 (>= 3.4.0), httr, magrittr, utils, rlang, tools

Config/roxygen2/version 8.1.0

Suggests testthat (>= 3.0.0), knitr, rmarkdown

VignetteBuilder knitr

Config/testthat/edition 3

NeedsCompilation no

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`calc_pest_phenology` *Calculate a simple-average degree-day index for trap observations*

Description

Calculate a simple-average degree-day index for trap observations

Usage

```
calc_pest_phenology(
  trap_data,
  pest = NULL,
  lat = NULL,
  lon = NULL,
  weather_source = "open_meteo",
  cimis_csv_path = NULL,
  custom_lower = NULL,
  custom_upper = NULL,
  custom_thermal_requirement = NULL,
  custom_flight_interval = NULL,
  custom_pest_label = NULL,
  upper_cutoff = c("explicit", "none", "horizontal"),
  weather_data = NULL,
  weather_provenance = NULL,
  timezone = "auto",
  open_meteo_model = "era5_land",
  database = NULL
)
```

Arguments

`trap_data`	Data frame with date and trap_counts, one row per date.
`pest`	Optional database code.

lat, lon	Weather coordinates.
weather_source	open_meteo, daymet, cimis_csv, or supplied.
cimis_csv_path	Path to CIMIS Fahrenheit daily report.
custom_lower, custom_upper	Optional Fahrenheit threshold overrides.
custom_thermal_requirement	Optional user-defined thermal marker (Fahrenheit DD).
custom_flight_interval	Deprecated alias for custom_thermal_requirement.
custom_pest_label	Optional plot label.
upper_cutoff	"explicit", "none", or "horizontal". Missing database upper thresholds require an explicit "none" choice or a supplied upper.
weather_data	Optional daily Date, tmin, tmax data in Fahrenheit.
weather_provenance	Description of provided temperatures/station/time convention.
timezone, open_meteo_model	Open-Meteo settings.
database	Optional database; defaults to TrackTrap::pest_thresholds.

Details

Biofix is always the first positive trap count; its DD is excluded. Daily DD is max(min(mean temperature, upper) - lower, 0), or no upper cap.

Value

Original data frame.

`fetch_open_meteo` *Fetch daily historical Open-Meteo temperatures in Fahrenheit*

Description

Fetch daily historical Open-Meteo temperatures in Fahrenheit

Usage

```
fetch_open_meteo(
  lat,
  lon,
  start_date,
  end_date = as.character(Sys.Date()),
  timezone = "auto",
  model = "era5_land"
)
```

Arguments

`lat`, `lon`	Coordinates.
`start_date`, `end_date`	Requested dates, inclusive.
`timezone`	IANA timezone or "auto"
`model`	Explicit archive model identifier.

`pest_thresholds` *Pest temperature thresholds and thermal reference values*

Description

Reference parameters and source information for 90 pest records. Missing parameters are stored as NA. Inclusion does not imply that a complete or independently validated phenology model is available.

Usage

```
pest_thresholds
```

Format

A data frame with 90 rows and 10 variables:

pest_code Unique pest identifier.

pest_name Common name.

scientific_name Scientific name.

lower_thresh Lower temperature threshold in degrees Fahrenheit.

upper_thresh Upper temperature threshold in degrees Fahrenheit, where available.

thermal_requirement_dd Thermal reference value in Fahrenheit degree-days for the stated endpoint; not necessarily a flight interval.

lower_source Reference supporting the lower threshold.

upper_source Reference supporting the upper threshold.

thermal_requirement_source Reference for the thermal value.

thermal_requirement_endpoint Developmental or phenological endpoint associated with the thermal value.

Details

Parameter sources and model compatibility require assessment before application. Seasonal event thresholds and developmental requirements are not interchangeable.

`plot_trap_phenology` *Plot trap catches against the calculated DD index*

Description

Plot trap catches against the calculated DD index

Usage

```
plot_trap_phenology(
  pheno_data,
  pest = NULL,
  year = NULL,
  lat = NULL,
  lon = NULL,
  custom_thermal_requirement = NULL,
  repeat_markers = FALSE,
  custom_flight_interval = NULL,
  custom_pest_label = NULL
)
```

Arguments

`pheno_data`	Output of calc_pest_phenology().
`pest`	Optional label only; never used to retrieve marker intervals.
`year`, `lat`, `lon`	Optional title settings.
`custom_thermal_requirement`	Optional user-defined marker in Fahrenheit DD.
`repeat_markers`	If TRUE, show user-defined multiples; default FALSE.
`custom_flight_interval`	Deprecated alias for custom_thermal_requirement.
`custom_pest_label`	Optional title label.

Details

When a thermal marker is selected, the subtitle displays its value. A matching database reference supplies the developmental endpoint; otherwise the endpoint is reported as unspecified. The caption explains the reference and distinguishes first-capture multiples from observed generations. Database requirements are not automatically selected as markers.

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