

DyeFreedman_ENV872_EDS_FinalProject

This repository is for the Final Project of Environmental Data Analytics.

Topic: We are examining Pika demography and climate data from the Niwot Ridge LTER site. Our goal is to understand Pika distribution changes over the past 10-15 years and examine whether there is any connection to the changing alpine climate. We also will investigate the prevalence of pests (mites and fleas) over time. Pika rely on alpine tundra, a habitat severely threatened by climate change, so understanding the population changes would be valuable for future species outlook.

Summary

<describe the purpose of this repository, the information it contains, and any relevant analysis goals. What, why, where, when, how?>

This repository was created to facilitate data storage and analysis for a research project analyzing the effects of climate change on the American pika at Niwot Ridge, CO. The goal was to understand Pika distribution changes over the past 10-15 years and examine the connection to a changing alpine climate. The prevalence of pests (mites and fleas) found on pikas was also assessed over time, as an increase in disease is a widely accepted consequence of climate change.

The repository contains raw and processed data files, metadata, information on the data sources, and code used for analysis and visualization.

Investigators

<name(s), affiliation(s), contact information, roles (if applicable)>

Authors: Jacob Freedman and Logan Dye

Keywords

Pika, climate change, temperature, alpine tundra, disease, spatial analysis, population analysis

Database Information

<describe the origin of all data in the repository, including data collected from outside sources and new data generated by the investigator(s). If data was accessed from an outside database, the date(s) of data access should also be included.>

Both climate and pika data was sourced from the Niwot Ridge LTER website on November 27th, 2022. All datasets are for public use and are available here: <https://nwt.lternet.edu/data-catalog> Significant wrangling was required to answer the research questions.

Folder structure, file formats, and naming conventions

<describe the folders contained in the repository, including what type of files they contain>

Metadata

<For each data file in the repository, describe the data contained in each column. Include the column name, a description of the information, the class of data, and any units associated with the data. Create a list or table for each data file.>

Metadata: Pika Demography Data at Niwot Ridge

File/Column Name	Description
pika_demography.cr.data.csv	Raw Pika Data csv file
LTER_site	Niwot Ridge LTER Site
local_site	WK=west knoll; LL=Long Lake; ML=Mitchell Lake; CG=Cable Gate
date	date
slope_asp	slope-aspect as cardinal direction or FLAT
easting	GPS E-W coordinate as UTM easting
northing	GPS N-S coordinate as UTM northing
tag_type	A = aluminum "rabbit" tag, C = ear-notching code
code_r_ear	color code of right ear
code_l_ear	color code of left ear
num_r_ear	number of right ear, N = Notch, H = Hole, M = Mangled
num_l_ear	number of left ear, N = Notch, H = Hole, M = Mangled
weight	body weight (g)
stage	A = adult; J = juvenile
sex	sex
repro_status	P = pregnant, L = has lactated this year, T = testes detected by feel, U = no evidence
ear-mites_samp	Whether mites were collected (1=collected, 0=not collected)
ear-mite_obs	Ear mite cover: N = none, L = low (0-4 sq mm), M = medium (4-16 sq mm) or H = high (>16 sq mm)
fleas_samp	number of fleas collected
fleas_obs	number of fleas observed
tissue_samp	tissue sample collected: 1 = collected; 0 = not collected
hair_samp	hair sample collected: 1 = collected; 0 = not collected
urine_samp	urine sample collected: 1 = collected; 0 = not collected
feces_samp_dry	dry pellet fecal sample collected: 1 = collected; 0 = not collected
feces_samp_wet	wet pellet fecal sample collected: 1 = collected; 0 = not collected
feces_samp_cae	caecal fecal sample collected: 1 = collected; 0 = not collected
blood_samp_r-o	blood sample collected via retro-orbital bleeding: 1 = collected; 0 = not collected
blood_samp_ear	blood sample collected from ear: 1 = collected; 0 = not collected
smear	slide with blood smear prepared: 1 = collected; 0 = not collected
nobuto	Nobuto strip saturated with blood: 1 = collected; 0 = not collected
saliva_samp	saliva sample collected with cotton swab: 1 = collected; 0 = not collected
rectal_temp	rectal temperature (C)
neck_circ	circumference of neck (cm)
foot_length	foot length (mm)

Metadata: Climate Data at Niwot Ridge

File/Column Name	Description
d-1cr23x-cr1000.daily.ml.data.csv	Raw Climate Data csv file
LTER_site	Niwot Ridge LTER site
local_site	C1 site
logger	data logger type (CR23X or CR1000)
date	date (yyyy-mm-dd)
year	year (yyyy)
jday	Julian day
airtemp_max	maximum air temperature (C)
flag_airtemp_max	flag for maximum air temperature: n=no flag; m=missing; q=questionable; e=estimated
airtemp_min	minimum air temperature (C)
flag_airtemp_min	flag for minimum air temperature: n=no flag; m=missing; q=questionable; e=estimated
airtemp_avg	average air temperature (C)
flag_airtemp_avg	flag for average air temperature: n=no flag; m=missing; q=questionable; e=estimated
rh_max	maximum relative humidity (Percent)
flag_rh_max	flag for maximum relative humidity: n=no flag; m=missing; q=questionable; e=estimated
rh_min	minimum relative humidity (Percent)
flag_rh_min	flag for minimum relative humidity: n=no flag; m=missing; q=questionable; e=estimated
rh_avg	average relative humidity (Percent)
flag_rh_avg	flag for average relative humidity: n=no flag; m=missing; q=questionable; e=estimated
bp_max	maximum barometric pressure (Millibars)
flag_bp_max	lag for maximum barometric pressure: n=no flag; m=missing; q=questionable; e=estimated
bp_min	minimum barometric pressure (Millibars)
flag_bp_min	flag for minimum barometric pressure: n=no flag; m=missing; q=questionable; e=estimated
bp_avg	average barometric pressure (Millibars)
flag_bp_avg	flag for average barometric pressure: n=no flag; m=missing; q=questionable; e=estimated
ws_max	maximum wind speed (m/s)
flag_ws_max	flag for maximum wind speed: n=no flag; m=missing; q=questionable; e=estimated
ws_min	minimum wind speed (m/s)
flag_ws_min	flag for minimum wind speed: n=no flag; m=missing; q=questionable; e=estimated
ws_avg	average wind speed (m/s)
flag_ws_avg	flag for average wind speed: n=no flag; m=missing; q=questionable; e=estimated
wd	average wind direction (degree)
flag_wd	flag for average wind direction: n=no flag; m=missing; q=questionable; e=estimated
solrad_avg (Watt/m ²)	
flag_solrad_avg	flag for average solar radiation: n=no flag; m=missing; q=questionable; e=estimated
solrad_tot	total solar radiation (Watt/m ²)

File/Column Name	Description
flag_solrad_tot	flag for total solar radiation: n=no flag; m=missing; q=questionable; e=estimated
soiltemp_5cm_avg	average soil temperature at 5cm (C)
flag_soiltemp_5cm_avg	flag for soil temp at 5cm: n=no flag; m=missing; q=questionable; e=estimated
soilmoist_5cm_avg	average soil moisture at 5cm
flag_soilmoist_5cm_avg	flag for soil moisture at 5cm: n=no flag; m=missing; q=questionable; e=estimated
airtemp_hmp1_max	maximum air temperature sensor 1 (C)
flag_airtemp_hmp1_max	flag for maximum air temperature sensor 1: n=no flag; m=missing; q=questionable; e=estimated
airtemp_hmp1_min	q=questionable; e=estimated minimum air temperature sensor 1 (C)
flag_airtemp_hmp1_min	flag for minimum air temperature sensor 1: n=no flag; m=missing; q=questionable; e=estimated
airtemp_hmp1_avg	average air temperature sensor 1 (C)
flag_airtemp_hmp1_avg	flag for average air temperature sensor 1: n=no flag; m=missing; q=questionable; e=estimated
airtemp_hmp2_max	maximum air temperature sensor 2 (C)
flag_airtemp_hmp2_max	flag for maximum air temperature sensor 2: n=no flag; m=missing; q=questionable; e=estimated
airtemp_hmp2_min	minimum air temperature sensor 2 (C)
flag_airtemp_hmp2_min	flag for minimum air temperature sensor 2: n=no flag; m=missing; q=questionable; e=estimated
airtemp_hmp2_avg	average air temperature sensor 2 (C)
flag_airtemp_hmp2_avg	flag for average air temperature sensor 2: n=no flag; m=missing; q=questionable; e=estimated
airtemp_hmp3_max	maximum air temperature sensor 3 (C)
flag_airtemp_hmp3_max	flag for maximum air temperature sensor 3: n=no flag; m=missing; q=questionable; e=estimated
airtemp_hmp3_min	minimum air temperature sensor 3 (C)
flag_airtemp_hmp3_min	flag for minimum air temperature sensor 3: n=no flag; m=missing; q=questionable; e=estimated
airtemp_hmp3_avg	average air temperature sensor 3 (C)
flag_airtemp_hmp3_avg	flag for average air temperature sensor 3: n=no flag; m=missing; q=questionable; e=estimated
rh_hmp1_max	maximum relative humidity sensor 1 (Percent)
flag_rh_hmp1_max	flag for maximum relative humidity sensor 1: n=no flag; m=missing; q=questionable; e=estimated
rh_hmp1_min	minimum relative humidity sensor 1 (Percent)
flag_rh_hmp1_min	flag for minimum relative humidity sensor 1: n=no flag; m=missing; q=questionable; e=estimated
rh_hmp1_avg	average relative humidity sensor 1 (Percent)
flag_rh_hmp1_avg	flag for average relative humidity sensor 1: n=no flag; m=missing; q=questionable; e=estimated
rh_hmp2_max	maximum relative humidity sensor 2 (Percent)
flag_rh_hmp2_max	flag for maximum relative humidity sensor 2: n=no flag; m=missing; q=questionable; e=estimated
rh_hmp2_min	minimum relative humidity sensor 2 (Percent)
flag_rh_hmp2_min	flag for minimum relative humidity sensor 2: n=no flag; m=missing; q=questionable; e=estimated
rh_hmp2_avg	average relative humidity sensor 2 (Percent)

File/Column Name	Description
flag_rh_hmp2_avg	flag for average relative humidity sensor 2: n=no flag; m=missing; q=questionable; e=estimated
rh_hmp3_max	maximum relative humidity sensor 3 (Percent)
flag_rh_hmp3_max	flag for maximum relative humidity sensor 3: n=no flag; m=missing; q=questionable; e=estimated
rh_hmp3_min	minimum relative humidity sensor 3 (Percent)
flag_rh_hmp3_min	flag for minimum relative humidity sensor 3: n=no flag; m=missing; q=questionable; e=estimated
rh_hmp3_avg	average relative humidity sensor 3 (Percent)
flag_rh_hmp3_avg	flag for average relative humidity sensor 3: n=no flag; m=missing; q=questionable; e=estimated

Scripts and code

<list any software scripts/code contained in the repository and a description of their purpose.>

Quality assurance/quality control

<describe any relevant QA/QC procedures taken with your data. Some ideas can be found here:> <https://www.dataone.org/best-practices/develop-quality-assurance-and-quality-control-plan> <https://www.dataone.org/best-practices/ensure-basic-quality-control> <https://www.dataone.org/best-practices/communicate-data-quality> <https://www.dataone.org/best-practices/identify-outliers> <https://www.dataone.org/best-practices/identify-values-are-estimated>