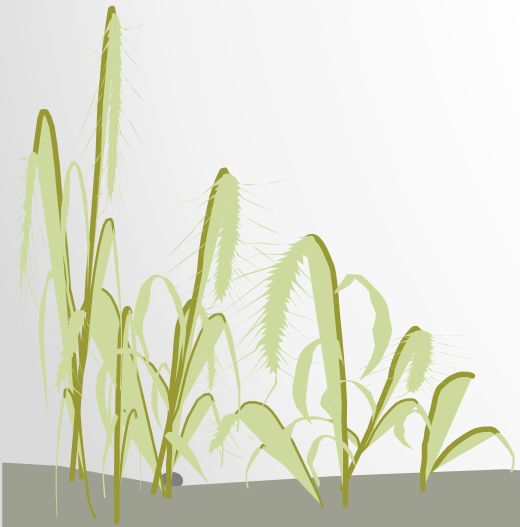# Phenology Study

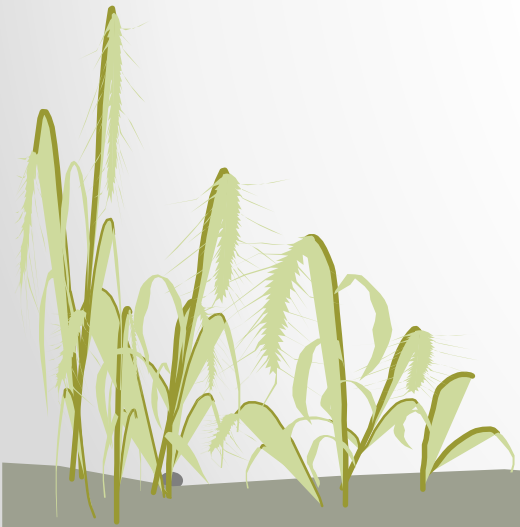Jean Lafitte National Historical Park and Preserve

Overview

- The Project – Pratheeba Nalligounder Palanisami

- The Data – Priyanka Choudhary

- The Results – Mike Rouw

- Prepared for UNO ISQA 8086 Special Topics – Data to Decisions, Fall 2019
- https://github.com/priya0318/PartsPerMillion/tree/master/FinalSubmission

The Project

Pratheeba Nalligounder Palanisami

Background

- Jean Lafitte National Historical Park and Preserve
  - Located in the State of Louisiana just southwest of New Orleans
  - The largest part of the park is the Barataria Preserve, covering 26,000 acres of the Mississippi River delta
  - Named after Jean Lafitte, an infamous character who lived in and dominated the region in the early 1800s
  - First established as a state park in 1966, later designated as a national park in 1978

- Life in the Barataria Preserve
  - Home to three different ecosystems including hardwood forest, swamp and marshlands
  - Over 400 different species of plants are found in the preserve
  - Birds are also plentiful, with over 200 species making their homes in and around the area
  - Mammals may include armadillos, squirrels, rabbits, minx, coyote, and white-tail deer
  - Tree frogs, green anoles, and water snakes are plentiful, as are American alligators
  - Fish, crabs and other aquatic life are also found on the preserve, as are numerous varieties of insects
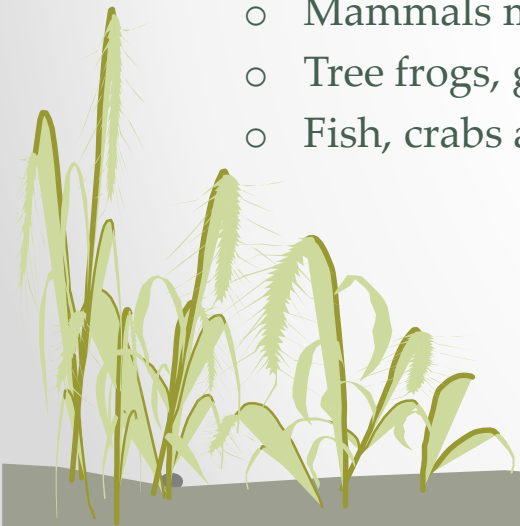
Audience Profile

- ## Dr. Elizabeth (Liz) Marchio
  - Currently working as Citizen Science Coordinator at Jean Lafitte National Historical Park
  - PhD in the Department of Recreation, Park, and Tourism Science with a specialty in Environmental Sociology

- ## Park Employees
  - Employed by the US National Park Service and funded largely by the US Department of the Interior
  - May include tour guides, information providers, maintenance personnel, historians, and others

- ## Volunteers
  - Dr. Marchio currently uses citizen volunteers to gather phenology data from the preserve
  - These are often repeat visitors hiking through the parks different trails on an ad-hoc basis

Phenology

- Definition
  - Phenology is the study of periodic plant and animal life cycle events and ….
  - how these are influenced by seasonal and interannual variations in climate, as well as habitat factors

- Phenophase Event
  - An observable stage in the annual life cycle of a plant or animal that can be **defined** by a start and end point
  - **Examples** include the period over which newly emerging leaves are visible, or the period over which open flowers are present on a plant
  - Measurable elements for a phenophase event include start day, end day, and duration
  - Specific phenophase events can then be described over time and/or across different locations
  - Scientists are now beginning to study inter-relationships of phenophase events between species

Research Questions

- What is the time of year when the phenological event begins for the different species grouped by categories?

- What is the length of time observed for the phenological event for the species grouped by categories?

- Is there a time or duration change of the phenological event for any species during the three years of observations?

- Is there a difference in the time or duration for the species found in multiple regions of the phenological events?
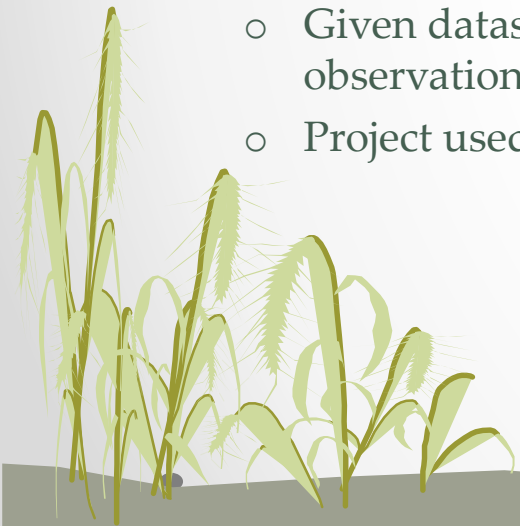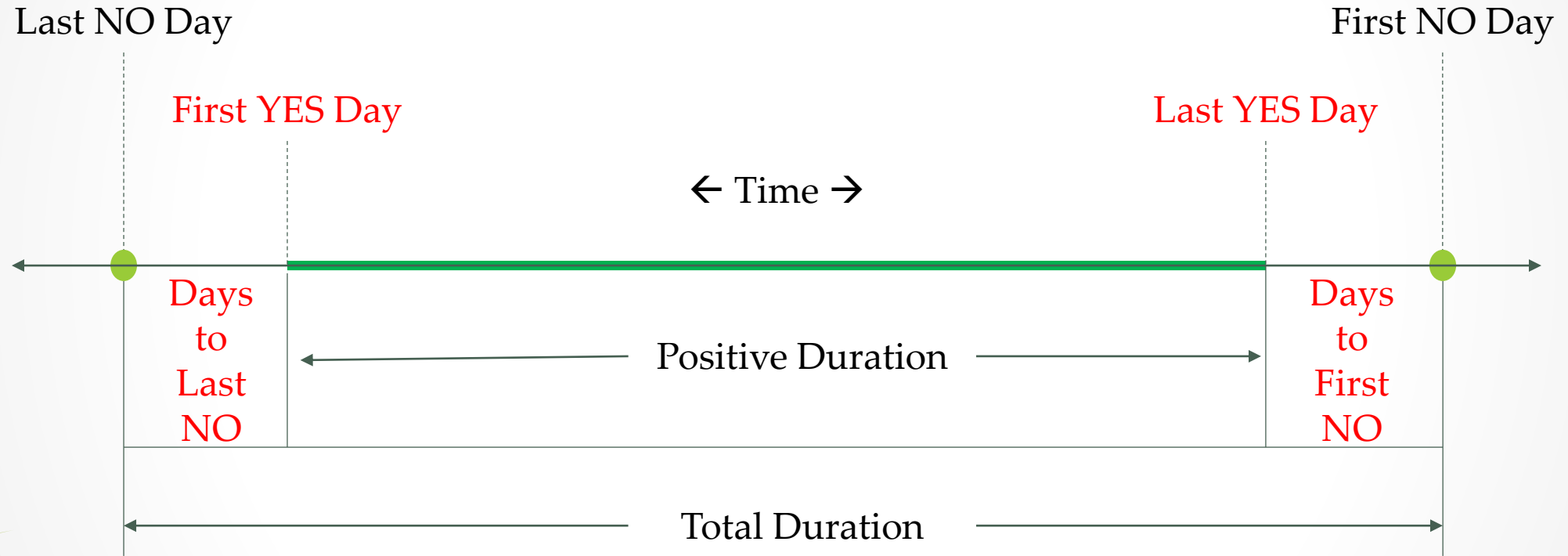
The Data

Priyanka Choudhary
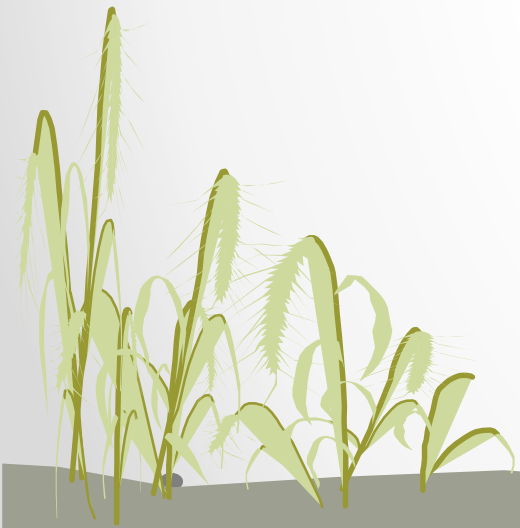
Data Overview

- Collected by volunteers with some training while hiking trails
  - Collected from four separate trails within the park
  - Data provided from late summer 2017 through mid summer 2019
  - Over two dozen different species of plants and birds
  - Over two dozen different phenophase events measured
  - Data is primary (collected for phenology study) and observed (viewed and recorded without influence)

- Dataset provided for the project
  - Metadata information was provided giving solid definitions for each column
  - Observation data was well organized with single rows showing specific observation information
  - Given dataset was NOT the original observations, but rather statistical values for single and multiple observations of the same event on the same species at the same location during the same year
  - Project used the provided means for the study, as most had only one or two observations

Data Structure

Data Cleaning

- Pass Number One
  - Problem – some data was incomplete, showing only a First YES Day or a Last YES Day, but not both
  - Solution – if either YES was missing, it was set to the other YES, giving a positive duration of ONE day with ZERO days to the nearest NO

- Pass Number Two
  - Problem – filtering and selecting only rows and columns needed for the analysis
  - Solution – rows were included if the data was complete, and columns were selected for those needed in the analysis

- Pass Number Three
  - Problem – only some of the data was provided, and other dates and durations needed to be calculated
  - Solution – columns were added for Last NO Day, First NO Day, Positive Duration and Total Duration

- Pass Number Four
  - Problem – some of the data observations contained impossible values, such as negative durations
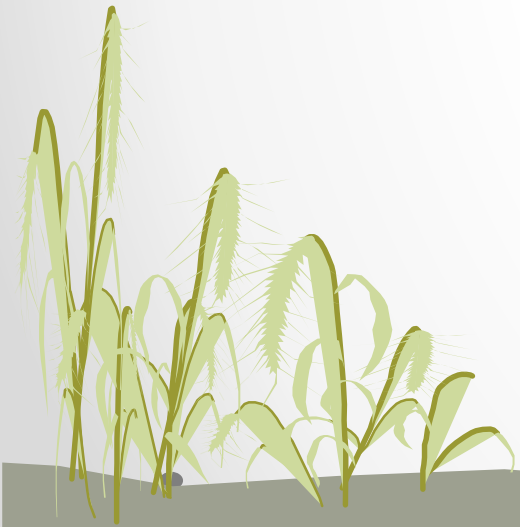 - Solution – rows were analyzed for temporal correctness, and those that failed were discarded
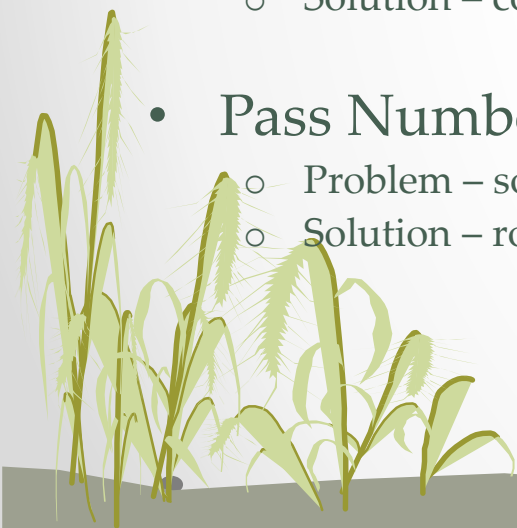
Data Enrichment

- Many rows did not contain complete information – e.g. missing a YES value
  - Result from cleaning, both YES dates are set to the same date, giving positive duration of one day
  - Raises possible issues with the quality of the data collection process

- Added new research question based the missing YES values
  - What is the extent of this missing YES value in the data?
  - Added a new column to the data to show ranges of positive duration for plotting

- Developed a new table showing means on four selected phenophases
  - Calculated means for First YES Day, Total Duration, and Positive Duration, all by location
  - Used the years 2017/2018 for fall phenophases, and the years 2018/2019 for the spring phenophases
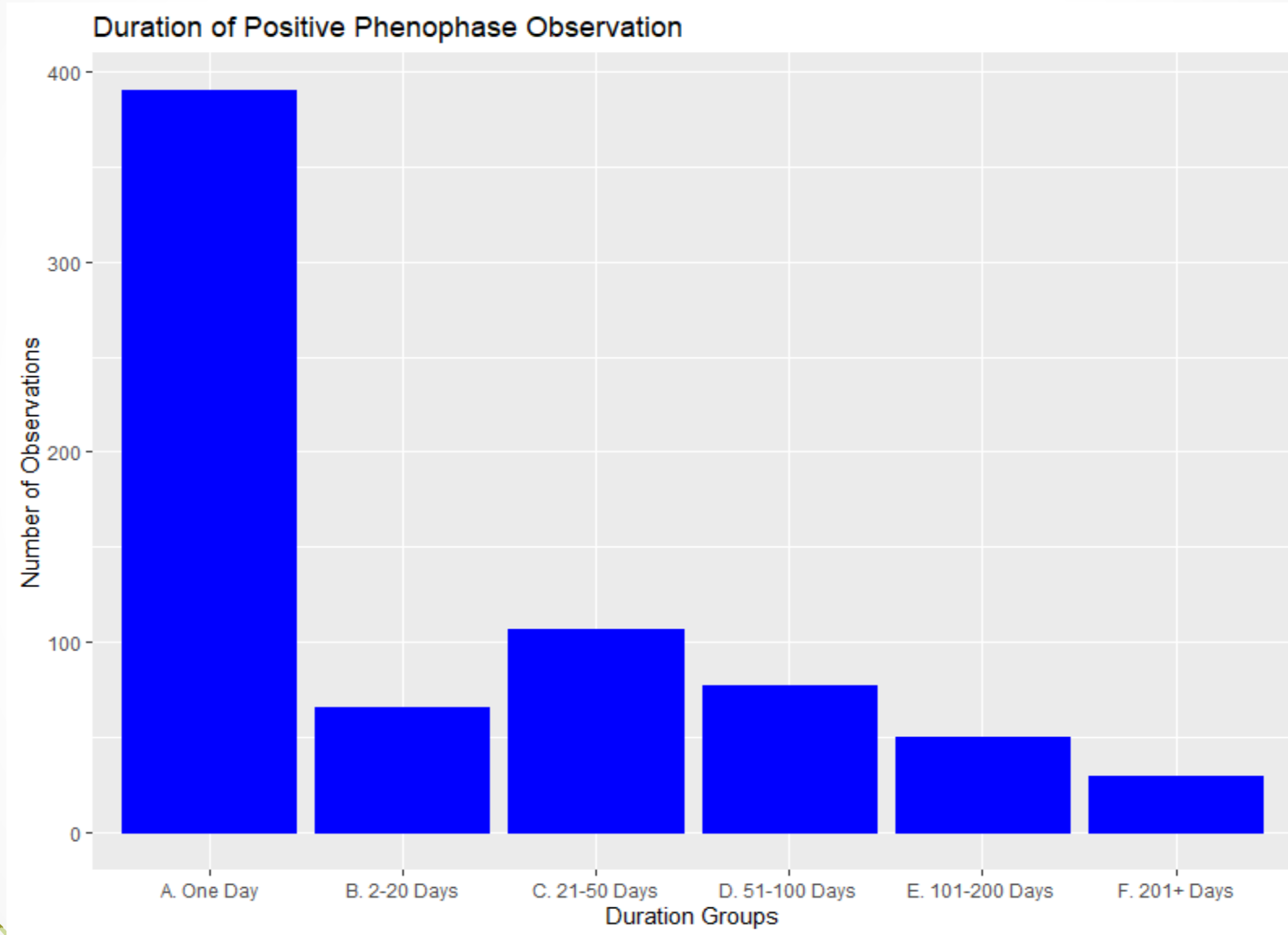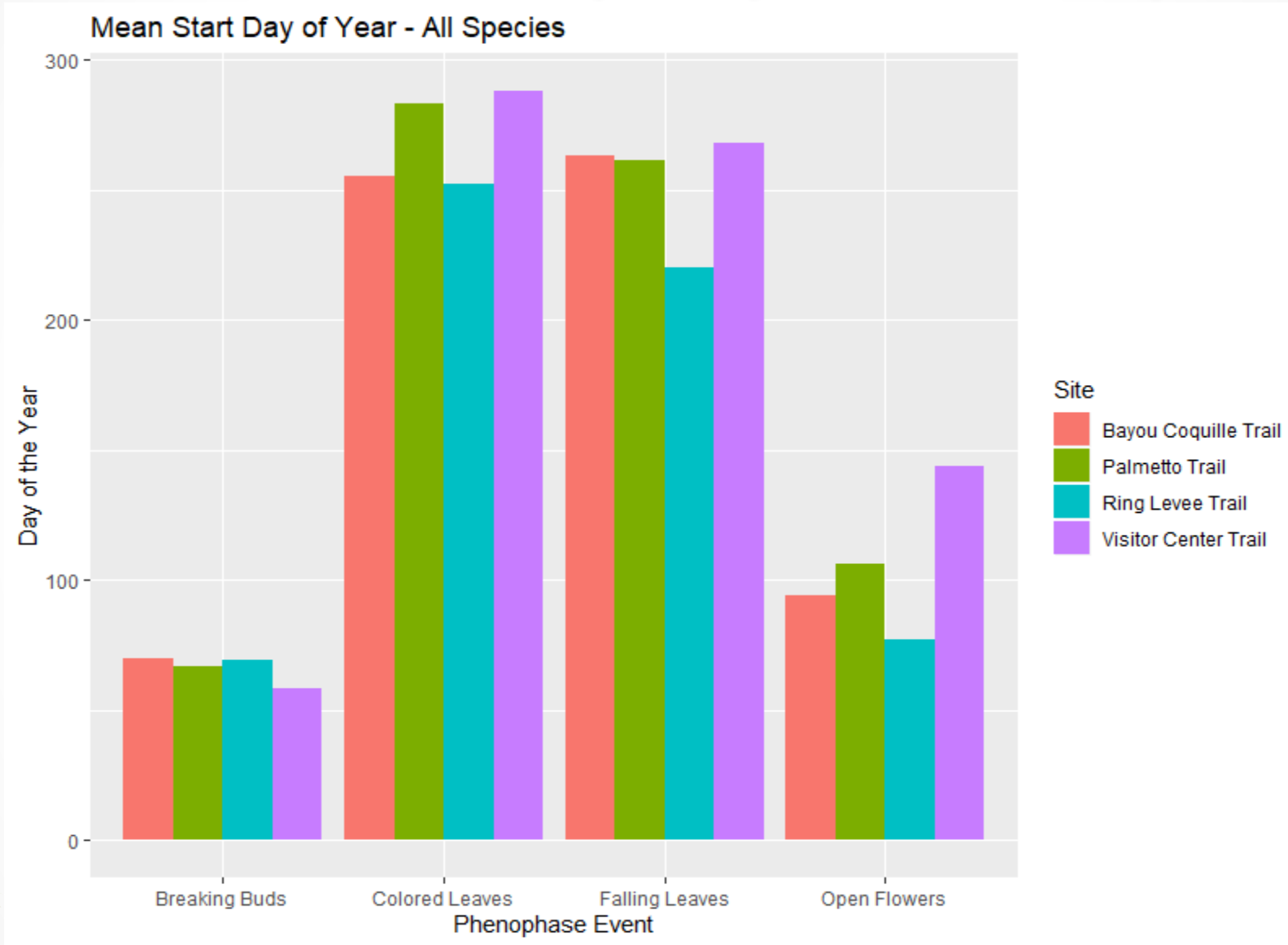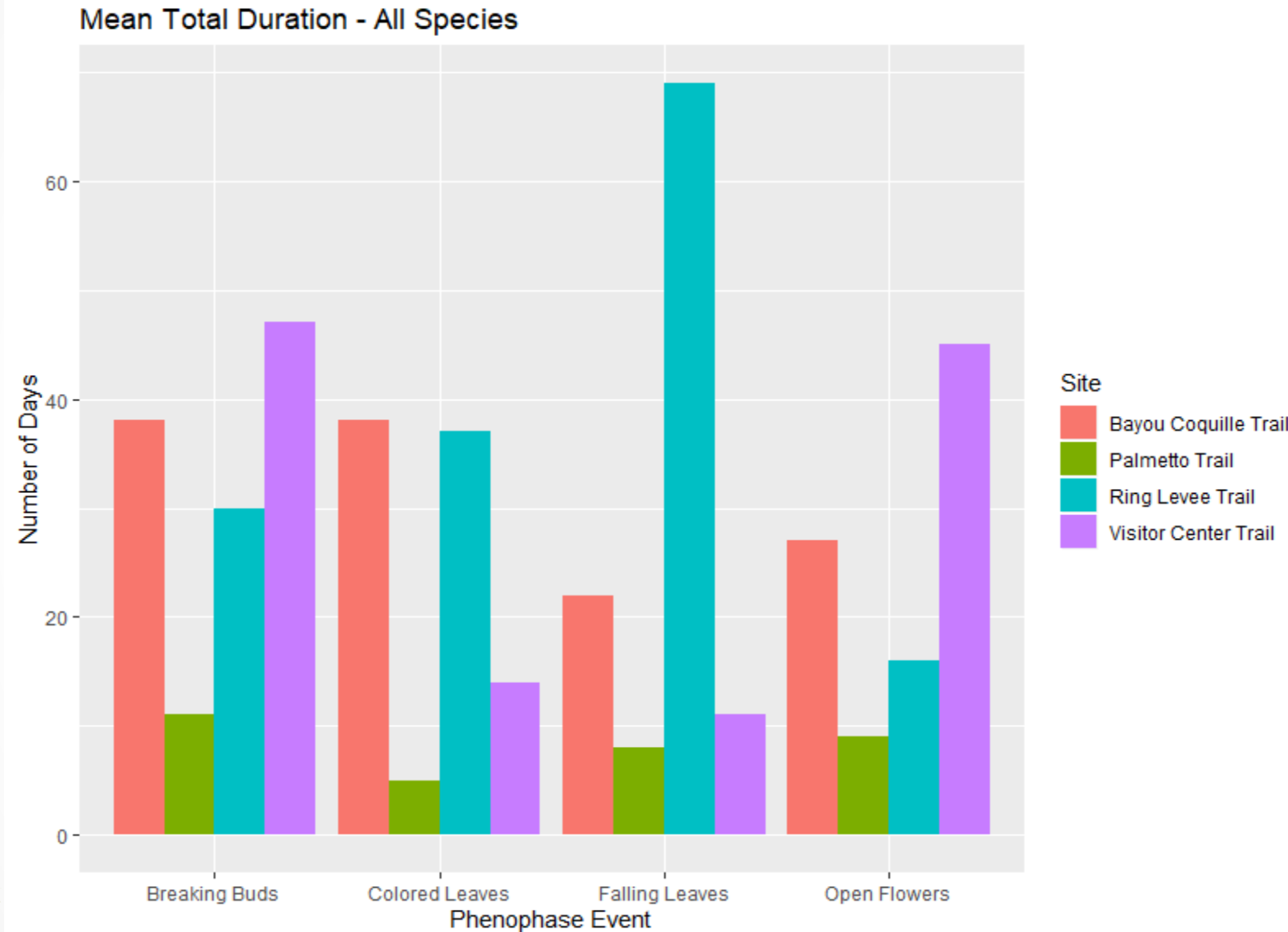
The Results
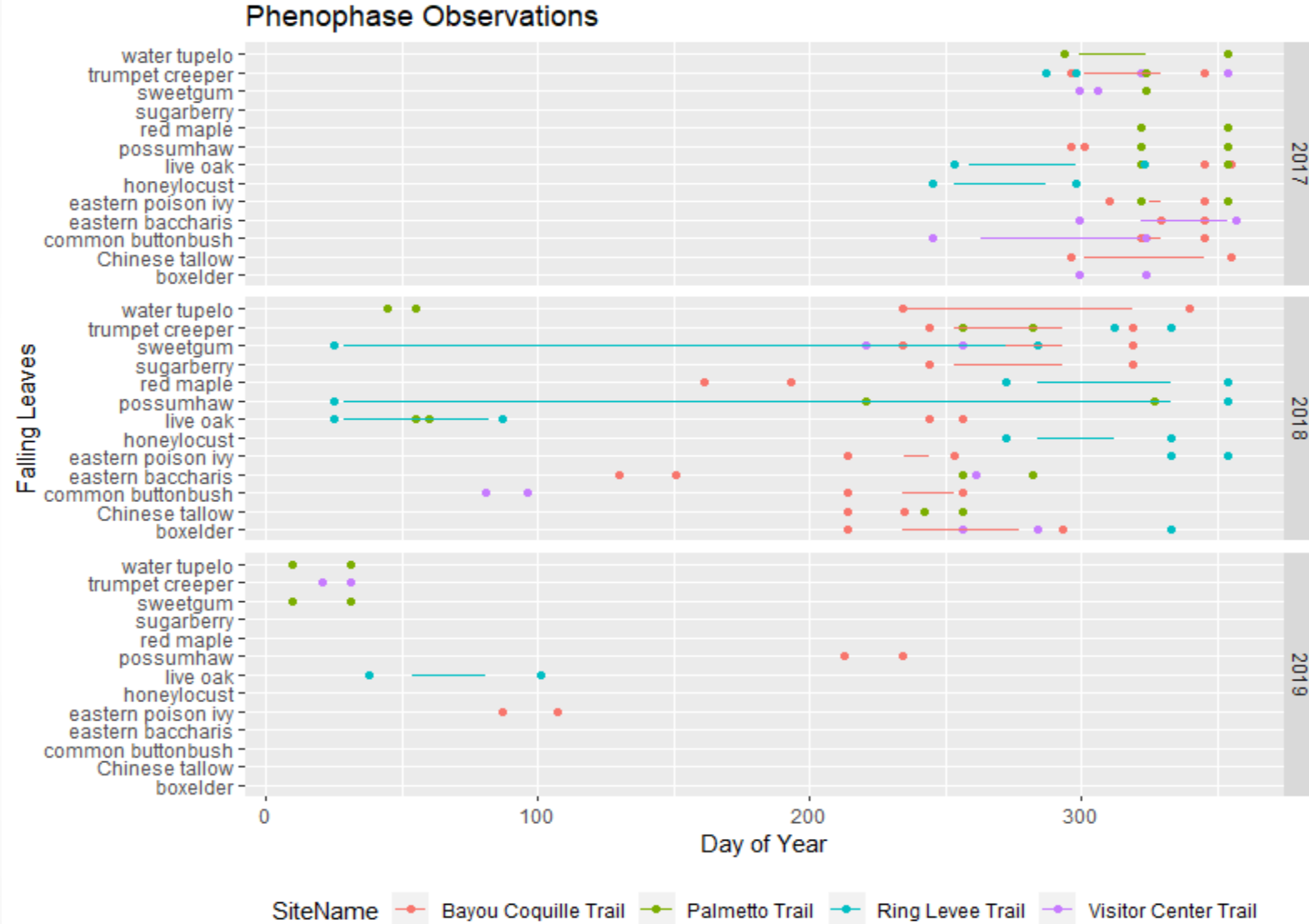
Mike Rouw

Frequency by Positive Duration

Duration of Positive Phenophase Observation

Mean Start Day by Phenophase

Mean Start Day of Year - All Species
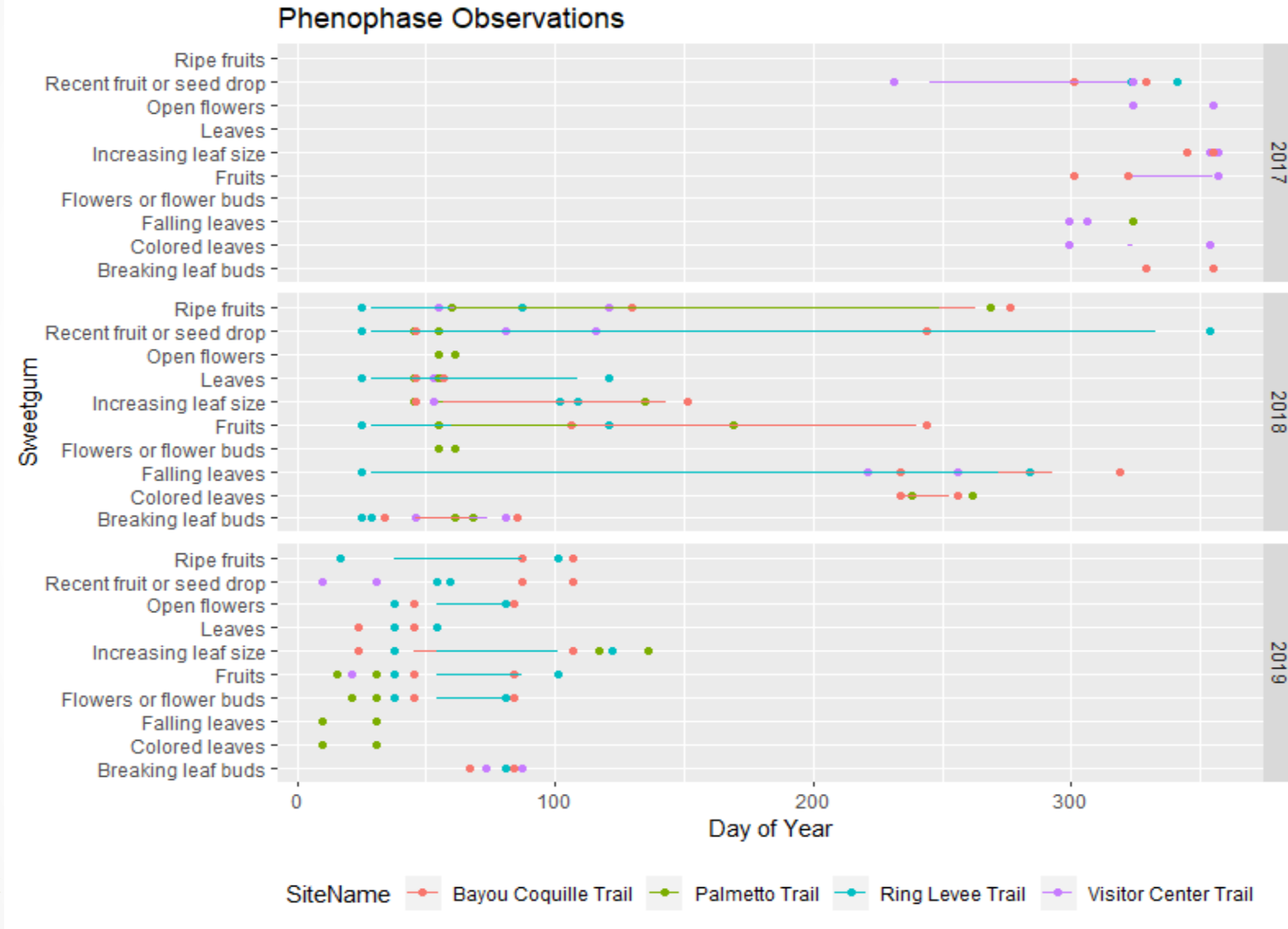
Mean Total Duration by Phenophase

Mean Total Duration - All Species
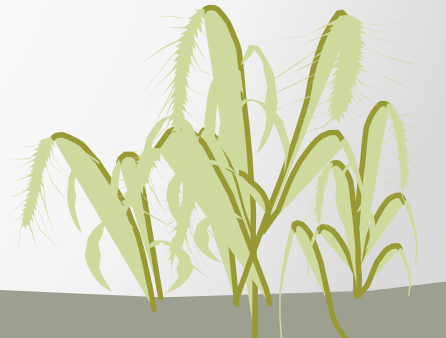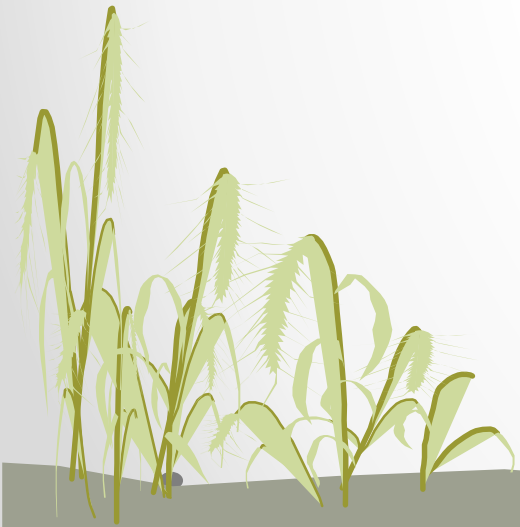
Phenophase Timing by Species

Species Timing by Phenophase

Conclusions

- Limited data over time makes year-to-year comparisons difficult

- Possible data collection issues make reliable conclusions hard to reach

- Though we did not have time, integrating weather data may be interesting

- Timing plots are available for all species and four selected phenophases

Thank You

Jean Lafitte National Historical Park and Preserve