<mark>Changes</mark>

<mark>Alpha Release Changes</mark>

<mark>Features Completed</mark>

Save the Bees

A Data Visualization Project on the loss of bee colonies and the stressors triggering colony loss throughout the United States.

Basic Information

Project Title: Drying Country
Description: A Data Visualization Project on the drought levels across the United States.
Author: Angela Rubalcava
Email: amrubalcava2@dons.usfca.edu
Github Repository: https://github.com/amrubal/amrubal.github.io
<mark>Webpage</mark>: https://amrubal.github.io/cs360proj.html

Background and Motivation

The fact that our planet is dying is no longer a faraway threat. Countless ecosystems and necessary life on our planet has been destroyed due to humanity's need for more. Bee's are currently dying at an alarming rate and both our economy and ecosystem are not prepared for a world without bees. I want to bring attention to an issue that has been known for a while, but it is hard to visualize the scale at which bee colonies are dying and why.

<mark>Project Objectives</mark>

This project will be able to communicate the rate at which bees are dying and what is contributing to their demise through easy-to-read charts and novel ways to engage the reader/viewer to care more about not just bees, but the well-being of our planet. In order to do this the project will include:
- An overview of the bee colony population in every state in the US
- Insight as to what variables/stressors have caused bee colonies to die
- Compare bee colony population across different states
  - Analyze states that have renovated and added colonies
  - Point out how renovations efforts help bee colony population

Data/Data Processing

The data is available on tidytuesday, https://github.com/rfordatascience/tidytuesday/blob/master/data/2022/2022-01-11/readme.md#stressorcsv , a github repository which contains collected data from many sectors.

The data is already available in csv so no processing will be required. The only edits to the data that will be made is to exclude regions/locations outside of the United States.

colony.csv

| variable	class	description
year	character	year
months	character	month
state	character	State Name (note there is United States and Other States)
colony_n	integer	Number of colonies
colony_max	integer	Maximum colonies
colony_lost	integer	Colonies lost
colony_lost_pct	integer	Percent of total colonies lost
colony_added	integer	Colonies added
colony_reno	integer	Colonies renovated
colony_reno_pct	integer	Percent of colonies renovated

`stressor.csv`

variable	class	description
year	character	Year
months	character	Month range
state	character	State Name (note there is United States and Other States)
stressor	character	Stress type
stress_pct	double	Percent of colonies affected by stressors anytime during the quarter, colony can be affected by multiple stressors during same quarter.

Visualization Design

MAIN PAGE

2021▾

DROP DOWN MENU
TO GET EACH
YEARS DATA

①

CA	OR	WA	UT
CO	NY	AZ	ID	NM

HEAT MAP IN
SHAPE OF BEEHIVE

REPRESENTS BEE
COLONY POP.
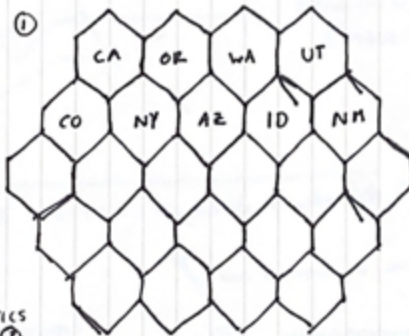
IMPORTANT STATISTICS ⓒ

year
determined
by dropdown
menu

MAX COLONIES
IN 2021*

MAX COLONIES LOST
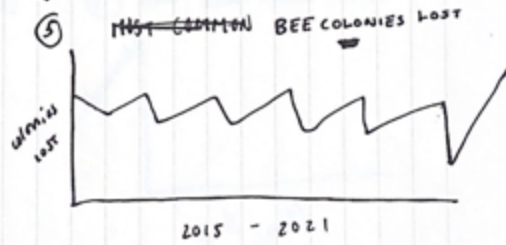IN 2021*

BIGGEST
STRESSOR IN
2021*

#

#

Stressor

③

% of colonies affected by stressor

* line for each stressor in different color

2015 — 2021
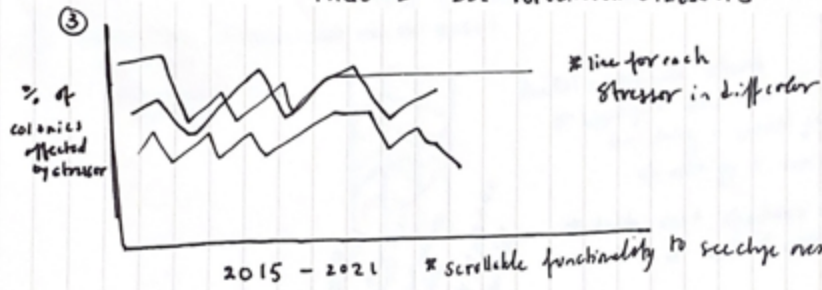
* scrollable functionality to see change over time

can be used to compare / make inferences

④ WHAT IS THE BIGGEST STRESSOR?

stressor rating

X   Y   Z   A   B

⑤ ~~MOST COMMON~~ BEE COLONIES LOST

colonies lost

2015 — 2021

PAGE 3   FIGHT TO SAVE BEES

⑥ STATES THAT HAVE FOUGHT FOR THE BEES !

~~HAVE LOST~~
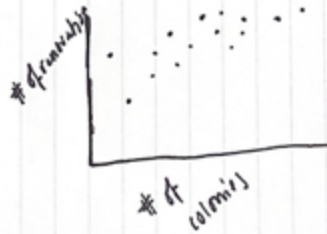~~LARGE AMOUNT~~
~~OF BEES~~

Parallel coordinate chart
* highlight states that
  are doing a good job
  of adding + renovating
* divide rest of states by region
  or neutral color

⑦ STATES THAT HAVE
   ADDED + RENOVATED MOST COLONIES

states

# of added + renovated
colonies
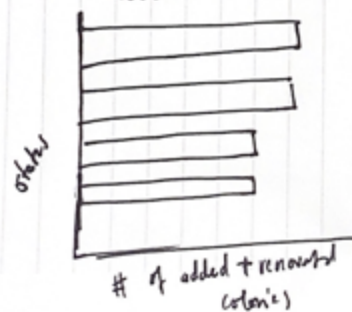
⑧ HOW RENOVATION HELPS

# of renovations

of
colonies

- Page 1
  - (0) Dropdown menu to select a year from 2015-2021
  - (1) Beehive shaped heat map of the overall bee colony population per state in the U.S.
  - (2) Display 3 Important statistics
    - Maximum amount of colonies in selected year
    - Maximum amount of colonies lost in selected year
    - Biggest stressor bee colonies face in selected year
- Page 2
  - Focus on stressors colonies face
    - (3) Line chart to show % of colonies affected by stressor through a scrollable timeline. There will be a line of different color to represent each stressor
    - (4) Bar Chart to rank the biggest stressor. The largest one will be highlighted a different color
      - Edit: most common
    - (5) Scrollable line chart to show the amount of bee colonies lost from 2015-2021
- Page 3
  - Focus on overall population/ which states have fought the hardest to keep their bee populations up
    - (6) Parallel coordinate chart uses # of colonies, # of colonies lost, # of colonies added, and # of colonies renovated and the state that ranks best will be highlighted. The rest of the states will either be colored by region or left a neutral color.
    - (7,8) Sideways bar chart to rank the states (top 5) that have added and renovated the most amount of colonies
      - Separate into two charts
    - (9) Scatterplot that shows how renovation helps bee colonies by showing the relationship between # of colonies renovated and # of colonies

Optional Features
- Find additional data to show how bee population can affect the US economically?
- Add features to hover/click on heat map to show more state specific data
- Zoom in feature for larger charts

Project Schedule

- March 23, 2022 Final Proposal Due
- March 20 - 26
    - Create visualizations 4 and 7 in d3
    - set up webpage for project
    - Begin to explore how charts would be added to webpage and how scrollable functions will work
        - Work on layout and gather resources necessary
- March 27 - April 2
    - Create visualization 8
    - Begin write ups for Alpha release
- April 6, 2022 Alpha Release Due
- April 3 - 9
    - Create visualizations 1,2, 3
    - Add drop down menu for visualizations 1 and 2
    - Begin adding scrolling functionality for visualizations 3 and 5
    - Add zoom in functionality to visualization 1
- April 10 - 16
    - Create visualizations 5,6 and 9
    - Continue to develop scrolling, zoom, and hover/tooltip functionality for charts
- April 20, 2022 Beta Release Due
- April 17 - 23
    - Finalize visualizations and ensure they work/look properly
    - Ensure functionalities work on webpage
    - Continue to debug/fix any issues that are not working
- April 24 - 30
    - Finalize and ensure all functionalities for charts are working
    - Create slides for final presentation and create any demos if necessary
- May 1 - 7
    - Ensure website is perfect and ready for presentation
    - Polish slides and begin practicing/prepping for presentation
    - Begin Project report draft
- May 9th Final Presentation Due
- May 8 - 14
    - Finalize project report draft

- ○ begin to accumulate everything necessary for final submission
- ● <mark>May 16th Project Report Draft Due</mark>
- ● May 14-18
  - ○ Prepare materials to submit the report, slides, code & data, and user manual for final submission
  - ○ Submit it by May 19th!
- ● <mark>May 19th Report, Slides, Code & Data, and User Manual Due</mark>

<mark>Related Work</mark>

- ● Resource that highlights bee colony loss due to stressors that includes pests and pathogens as well as looking into what other environmental, agricultural, and socioeconomic changes may be responsible.
  - ○ https://link.springer.com/article/10.1007/S10393-013-0870-2
- ● Resource that goes into depth regarding factors associated with bee colony loss. This resource gave me more context regarding bee colony loss and how certain attempts to save the bees are not as effective as the factors destroying them.
  - ○ https://www.mdpi.com/2306-7381/7/4/166/htm
- ● Resource contains some visualizations which illustrates the model in an attempt to better understand bee colony failure through the population of bee foragers. It is helpful to see/predict bee colony behavior depending on the death rate of certain bees.
  - ○ https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0018491
- ● Resource highlights the performance change in bee colonies with modified bee hives. This is important since a leading stressor for bees is climate change as unexpected climate affects bees ability to survive. This is potentially a new way to add bee colonies into hives that would allow bees to thrive regardless of the uncontrollable climate.
  - ○ https://faculty.ksu.edu.sa/sites/default/files/honey_bee_colonies_performance_enhance_by_newly_modified_beehives.pdf
- ● I read excerpts of this book to familiarize myself more with bees. They are fascinating creatures that are integral to our ecosystem and deserve to be protected. The reading really allowed for myself to gain more background knowledge on western bumble bees and their changing role/impact due to climate change.
  - ○ https://books.google.com/books?hl=en&lr=&id=yj9n1t7wEcEC&oi=fnd&pg=PA4&dq=states+with+most+bees&ots=geLMWSnWdP&sig=0a4BncvJhBsHdjwpzjY4B0jBeZM#v=onepage&q=states%20with%20most%20bees&f=false

Alpha Release

Immediate Milestones:
- Finish visualization 1,2,3 by 04/10
- Add visualizations to website by 04/12
- Finish visualizations 5,6,9 by 04/15
- Begin adding interactions
- Start working on slides and demos for Beta Release by 04/19

Roadblocks:

I have a lot of data to parse through so I am having to decide between combining values across all years (2015-2021). I am not sure if I should account for only 2021 or have a filter to select data by year. I am worried how this will look to a user. Will they be overwhelmed by the amount of data and find it hard to compare? My other worry is creating the parallel coordinate chart. I have not made one before so it will most likely take me the longest. I am also somewhat unfamiliar with HTML so formatting my data visualizations on the website may take me longer than usual.

Visualization

https://vizhub.com/amrubal/06f81a74c8e04c9d987fc1f220f688ff

https://vizhub.com/amrubal/39c94b30ca5247ee80ce280fc9aae064

https://vizhub.com/amrubal/000c8adbbb9148358c18af5149848a2f