Imperiled Pollinators

A Presentation on Bees by Makayla Connelly at Skyline High School

My Research Question:

What are the Threats Facing commercial and native bee populations in California, and what can be done to mitigate them?

– Abstract

I chose this research topic because I have always had a connection to arthropods, especially bees. They are so vital to the world we live in, providing for 80% of plant pollination and contributing around 15 billion each year to the economy. In order to conduct research, I looked back on what threats I knew bees faced, and attempted to discover new ones as well. I used strategic online search methods to gather information about how these threats impact bees, if they do at all. I also conducted an interview with beekeeper Brian Peterson-Roest with Bees in the D to answer more of my questions and provide me with additional knowledge. I found that climate change, pollution, wildfires, and unsound agricultural tactics are some of the biggest threats bees are facing as they cause habitat loss, contamination, illness, poisoning, and overall, mass deaths of honeybees and native bees.

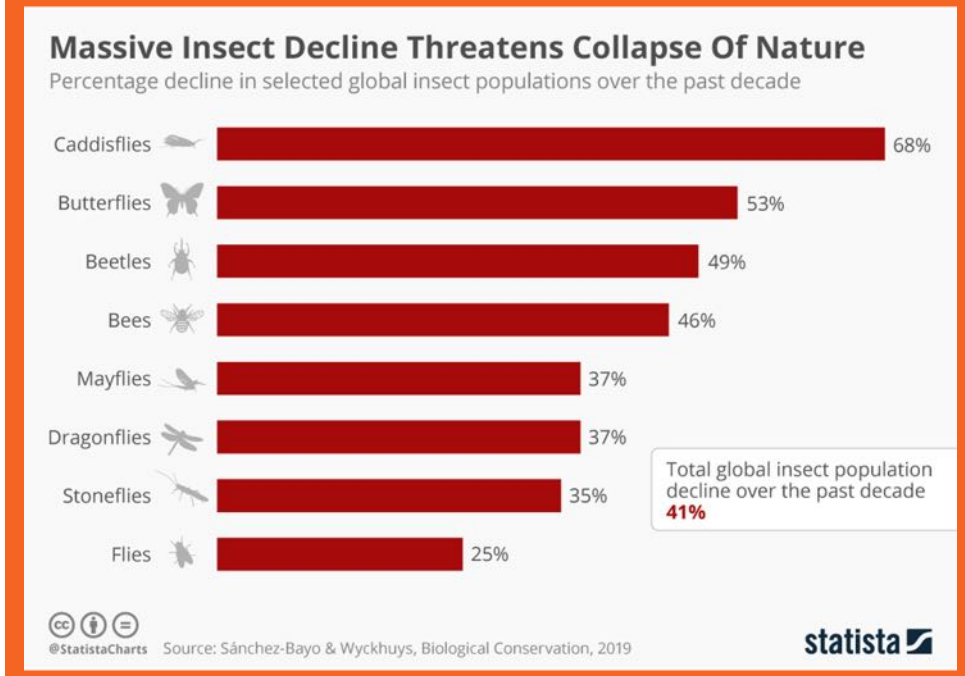
Hypothesis

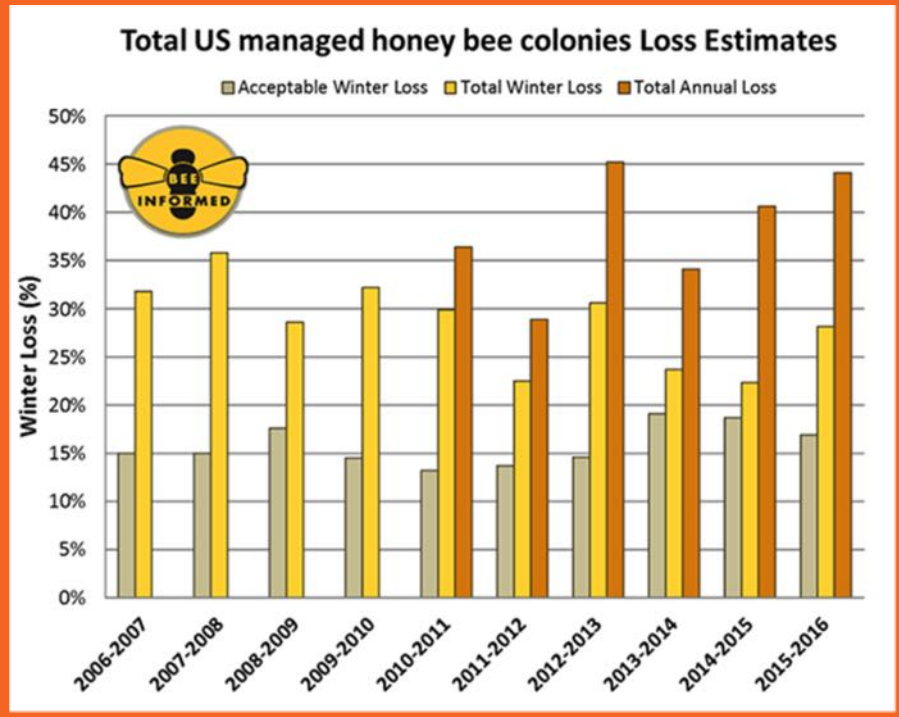
The biggest threats facing commercial and native bee populations in California are climate change, pollution , wildfires, and unsound agricultural practices. If we don't target and mitigate these threats, the consequences will be catastrophic.

Pollinator Populations Have Been In Decline

Since 2006, Honeybee and Native bee populations have been in steady decline.

From April 2018- April 2019, managed bee populations decreased by 40.7%





If Bee Populations Decline Enough...

- Economic decline
- Food shortages
- Environmental collapse
- Agricultural collapse
- Species extinction
- Societal change (manual pollination)
- Beekeepers lose way of life

History

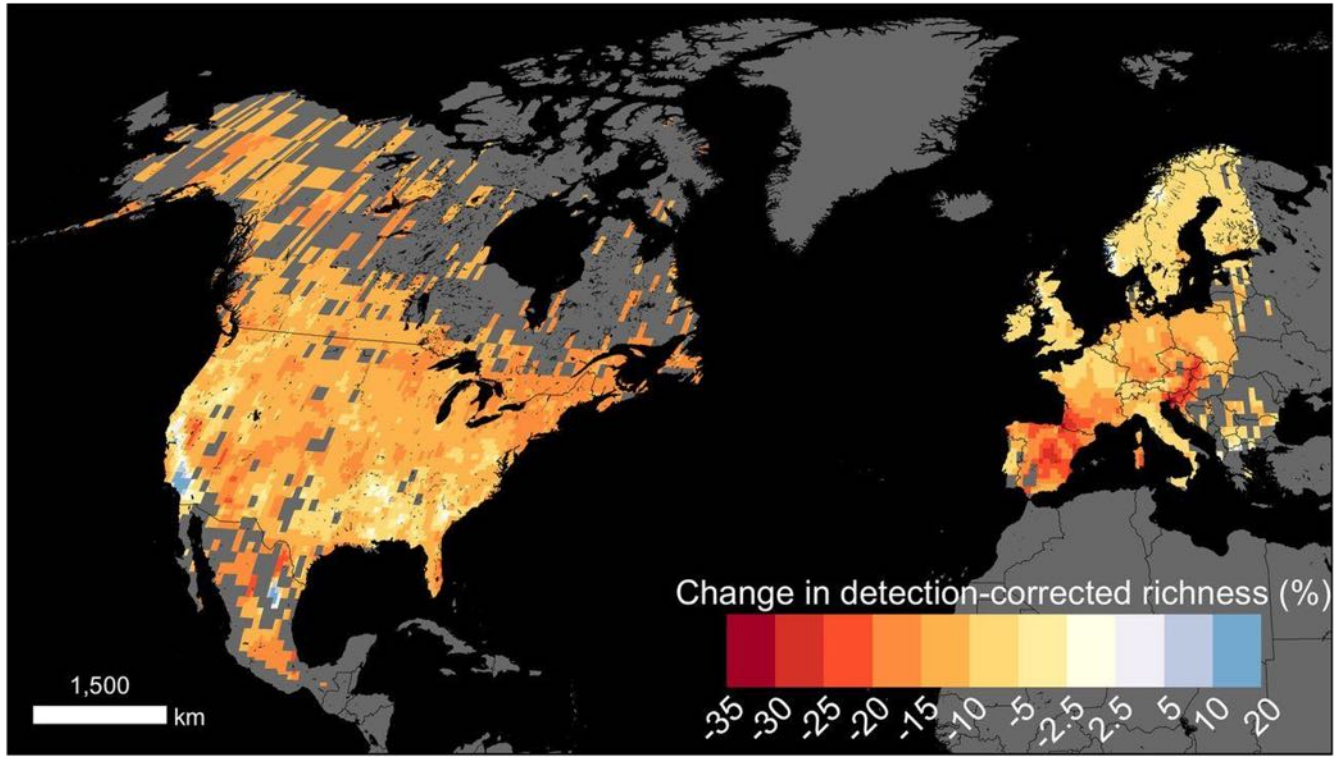
- 2006, Colony Collapse Disorder caused mass disappearances of honey bees
- Invasive Varroa mites wreaked havoc on hives
- Neonicotinoids poisoned hives, only some banned
- Diseases, habitat changes, and genetics were factors
- Threat from CCD declined, but populations still drop

Research Methods

My plan for collecting data was to use strategic online search methods to get the results I wanted from reputable sources. I also scheduled the interview with someone who I believed was reputable and relevant to speak on this issue and provide me with firsthand experience of these issues in action. Overall, I didn’t find many numerical tables of data or tests, but rather statistics and graphs to help me put this issue into perspective and prove my hypothesis true. All of the sources I used were ones I deemed reliable by examination of credibility.

Climate Change- Impacts

- Native bees lose livable habitat
- Certain bee species prone to overheating (bumblebees)
- As of 2020, 40% decline in bumblebees in North America
- Changes in seasons cause confusion, clustering problems
- Extreme weather destroys hives and homes
- Droughts are detrimental to plant growth



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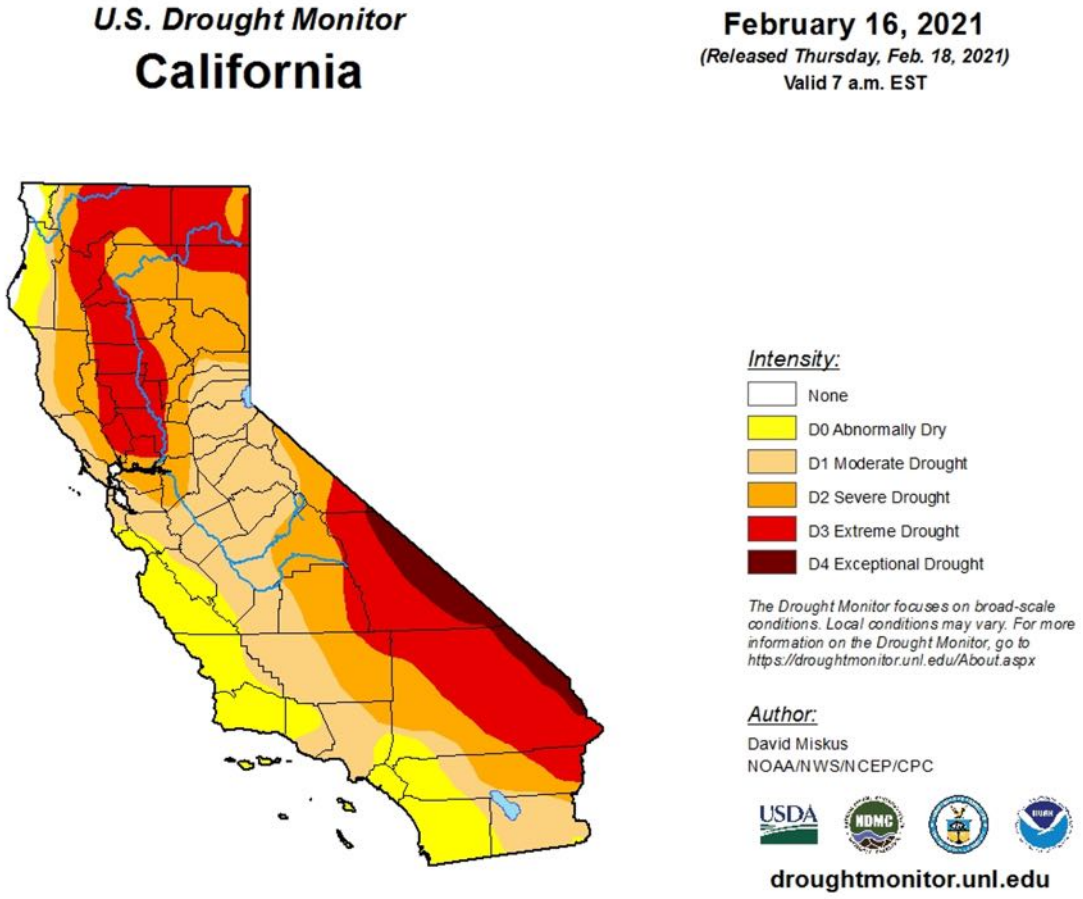
Climate Change- Plant Pollen

- 2016 Yale study found increased atmospheric CO2 decreases pollen protein
- Comparing 1842 and 2014 samples showed 30% less protein
- Studies exposing plants to 280-500 ppm confirmed
- Happens in goldenrod, key late season plant
- Bees consume “junk food”, malnutrition occurs

Climate Change- Droughts

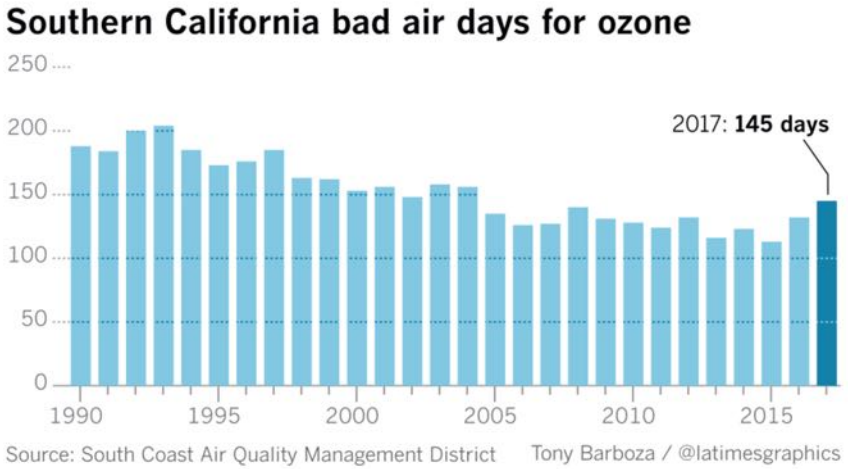
- “If there is what’s known as a dearth in the bee world, or a drought, that can be detrimental to your hive, I mean they may not survive because they don’t have enough food.”- Brian
- “A lot of beekeepers are forced to have to feed their bees during that time, and I do believe that climate change has a role in that.” - Brian
- “That can be very expensive for beekeepers, and on top of that, they lose money because now the bees aren’t bringing in extra nectar to make into honey, and they don’t have honey resources to sell anymore.”- Brian



Pollution- Impacts

Air Pollution:

- Ozone destroys floral aromas
- Ozone causes issues in plant reproduction
- Bees can't get enough food, become ill
- Olfactory responses inhibited, may be partially beneficial since varroa mites rely on it



Soil + Water Pollution:

- Litter clogs soil preventing growth, water preventing flow
- Chemicals leach into soil and water, affecting plant growth
- Plants are contaminated, bees become contaminated
- Bees become ill and unhealthy

Wildfires- Impacts

- Bees that nest underground may be safe
- Bees that nest above ground may be unsafe
- Few species nest in closed canopies, could provide more habitat
- Could also destroy habitat of certain species
- Smoke can affect navigation and flower sensing
- Impacts complicated

Agriculture- Impacts

- Native bees lose habitat space and specific food sources
- Commercial bees face malnutrition
- Mingling of too many bees leads to mite and disease spread
- Almond farms use more pesticides than any crop combined in US
- Pesticides harmful to bees, contaminates hives

“The bees that are in urban environments actually are healthier, and produce more honey, and I can be a real witness to that.” “Our urban hives are the top producers, our rural hives are the second, and the suburban areas, I get almost no honey from them.” - Brian

What We Can Do

- Work towards mitigating climate change
  - Support banning harmful pesticides
  - Support green energy and recycling
  - Plant native plants
  - Provide watering stations and nesting places
  - Spread the word, sign petitions
  - Educate yourself and others

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