
DECLINE IN COYOTE SIGHTINGS OVER TIME IN EAST COUNTY, SAN DIEGO

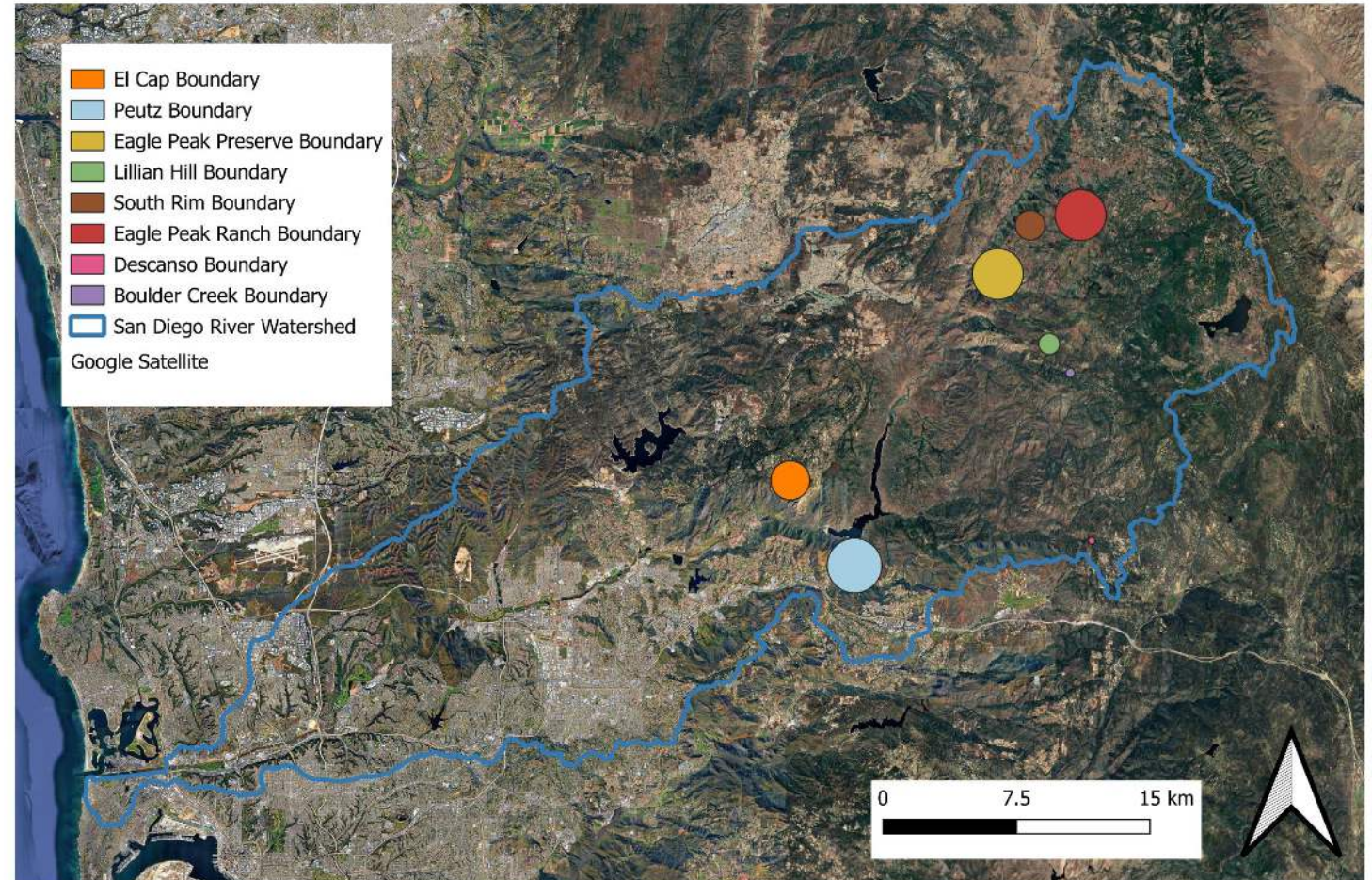
Emma Jeffress, Mary Kelly,
Cory Lee, & Nikki Mercer



Dataset Background

- Currently, SDRPF manages 8 preserve properties across East County
- Wildlife camera traps have been active from 2011-2025 along trails and near water sources and vegetation
- Photos are uploaded into Wildlife Insights twice a year to obtain metadata (e.g. date, time, species, coordinate location)

San Diego River Park Foundation Properties



Coyote highlights from 2025!



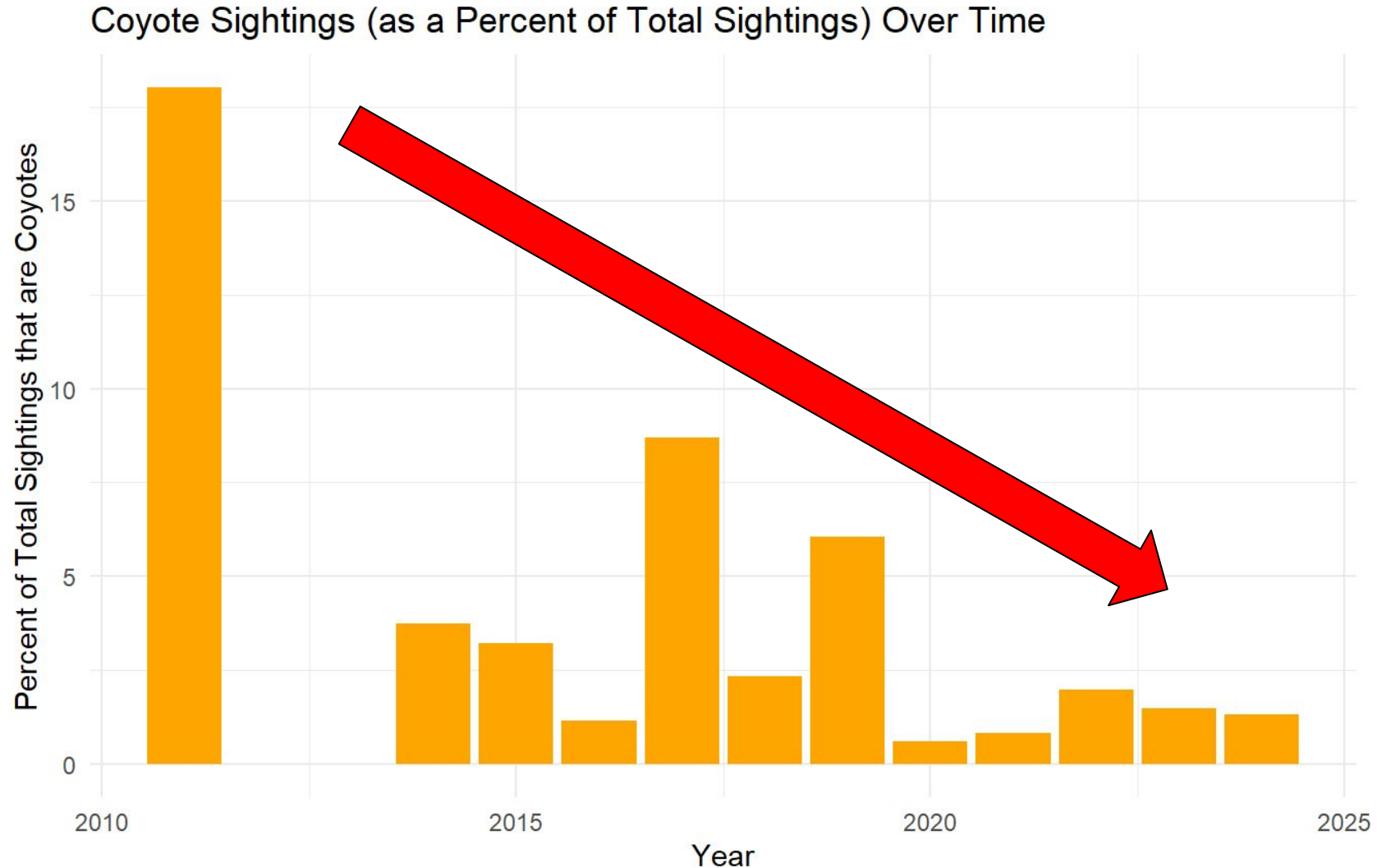
Coyote (*Canis latrans*) Background

- In the wild, coyotes prefer open, arid habitats where prey is abundant (e.g. rodents, deer, rabbits) (Urban Coyote Research Project). They are primarily carnivorous.
- However, coyotes are synanthropes, meaning they benefit from human settlements more than other animals (Urban Coyote Research Project).
- Simultaneously, humans are also the biggest threat to coyotes.
 - Humans are the primary cause of mortality for coyotes (Grinder & Krausman, 2001).
 - Development also leads to habitat fragmentation, impacting animals that have larger home ranges. This includes coyotes, of which solitary individuals have an average home range of 10 square miles (Urban Coyote Research Project).
- Coyotes are also subject to diseases such as distemper, mange, rabies, and parasites (Young, 2025).

Why do we care about coyotes?

- Predator-prey interactions
 - Coyotes are essential to moderating small mammal abundance and biodiversity, primarily rodents (Urban Coyote Research Project)
 - Extirpation of apex predators (i.e. wolves, grizzly bears, mountain lions) have also allowed coyotes to begin predating on larger mammals such as mule deer (Hody & Kays, 2018)
 - Predator-predator interactions (less well understood)
 - Compete with other carnivores for prey and territory (Fedriani et al., 2001; Urban Coyote Research Project)
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Annual Coyote Sightings Have Declined Over Time



Research Question

What influences coyote sightings in East County San Diego over time?



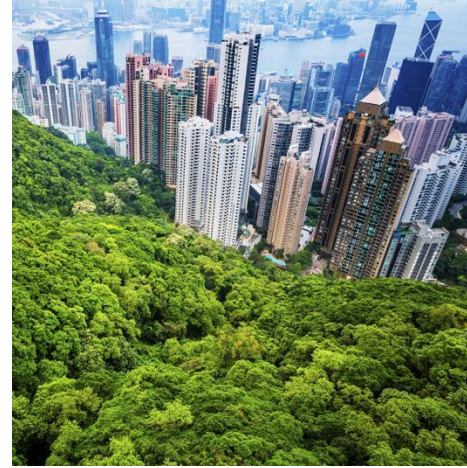
Hypothesis 1:

Increased rainfall correlates with increased coyote sightings because rainfall increases water, food, and habitat.



Hypothesis 2:

Preserves with open, arid chaparral and grasslands have more prey for coyotes, increasing coyote sightings in these areas.



Hypothesis 3:

While development negatively impacts coyote abundance, this impact is lessened by coyotes' ability to adapt to urbanization.

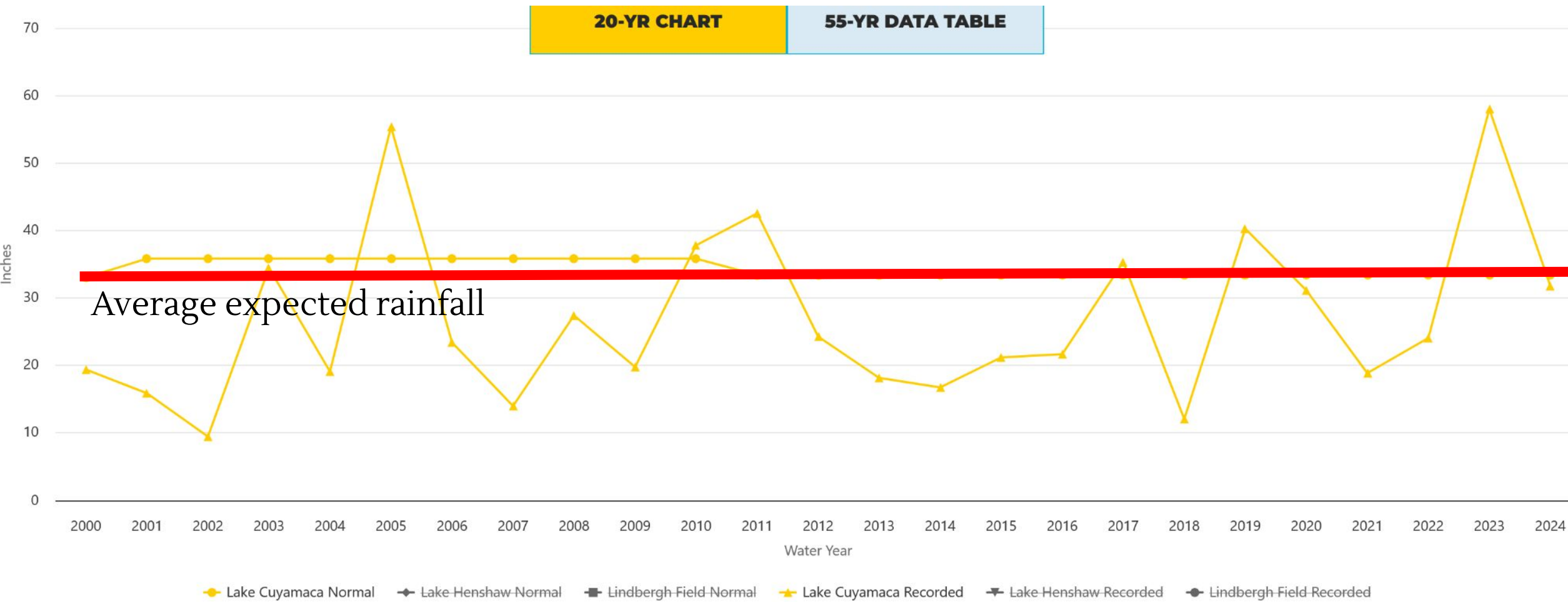


Hypothesis 4:

Habitat fragmentation reduces genetic diversity, leading to increased disease risk and subsequent decline in sightings over time.

Hypothesis 1: Rainfall

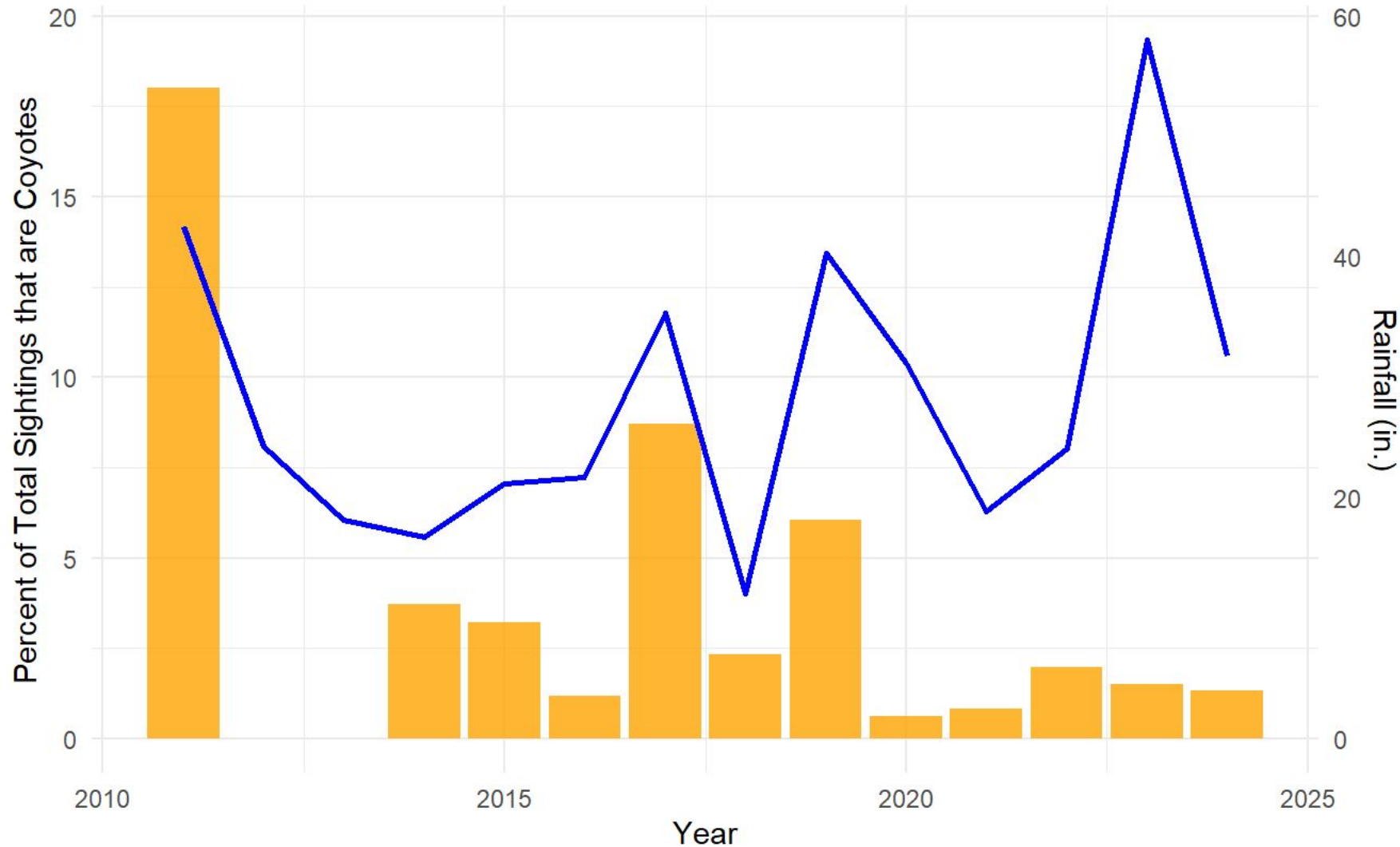
Rainfall (in./year) Over Time at Lake Cuyamaca



Source: San Diego Water Conservancy

Hypothesis 1: Rainfall

Relationship Between Coyotes Sightings and Rainfall Over Time



Annual Coyote Proportions Overlaid with Rainfall

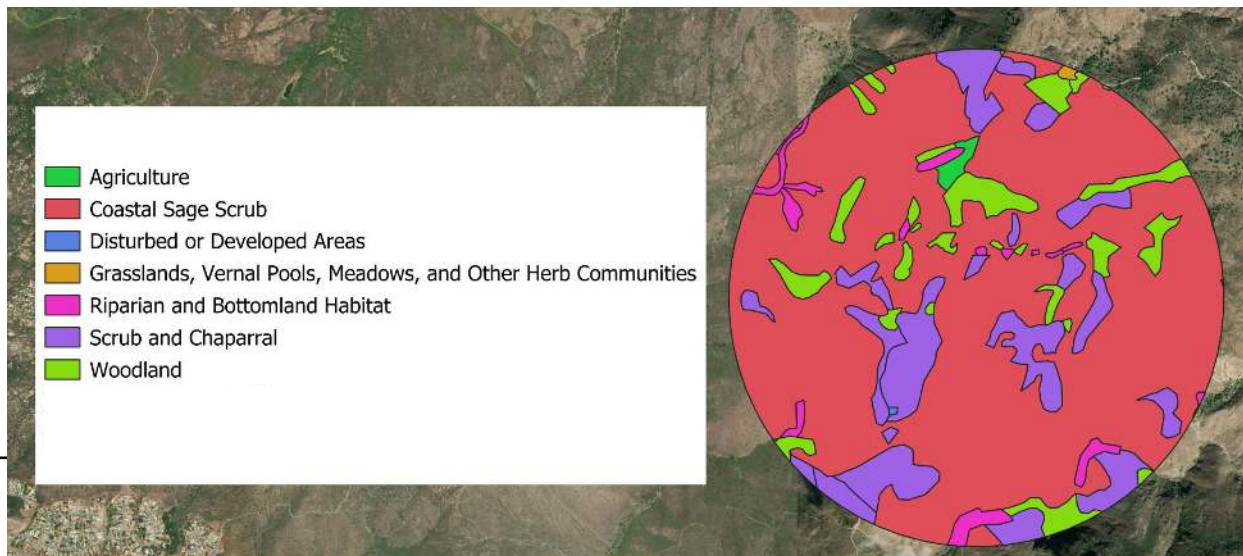
Rainfall appears to be correlated with the **yearly proportion of coyote sightings** from 2011-2023

Hypothesis 1 supported: Rainfall is generally proportional to coyote sightings

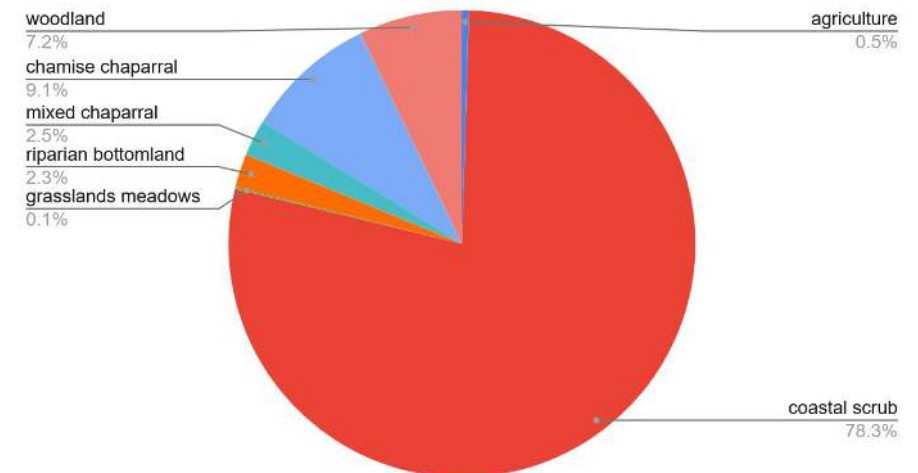
- Higher than average rainfall means:
 - Increased drinking water availability for animals, including coyotes
 - Reduction in the rate at which fire spreads and intensity with which it burns → decreased risk and stress for coyotes
- Rainfall can also influence vegetation (e.g. dryness, productivity, dominant species) (Tasoff, 2024)

Hypothesis 2: Certain habitats promote coyote sightings

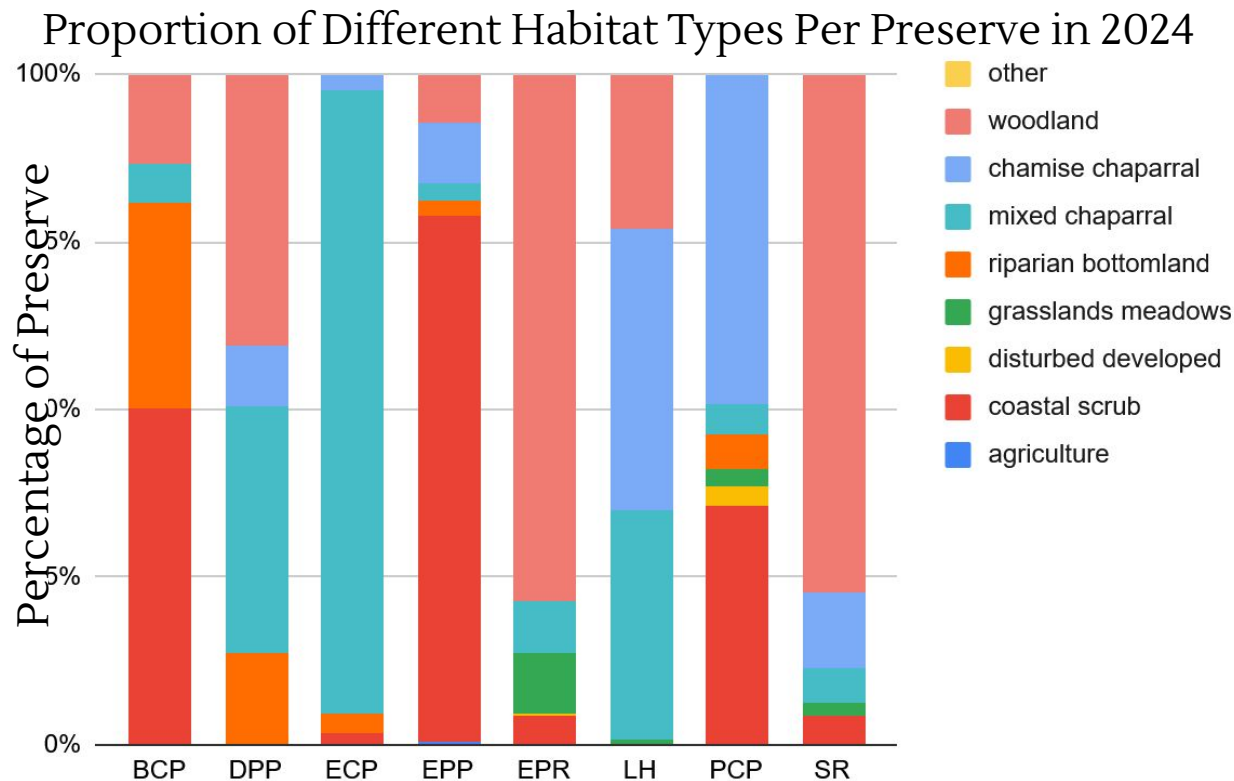
- QGIS methodology
 - Retrieved San Diego vegetation data from 2015 and 2024 from the SANDAG San Diego Regional Data Warehouse
 - For each preserve, we looked at what vegetation it was made of → broke down each preserve by habitat type



Eagle Peak Preserve Breakdown by Habitat Type



Coyote Sightings vs. Habitat Percentage



Preserve

BCP: Boulder Creek

DPP: Descanso Pond

ECP: El Cap

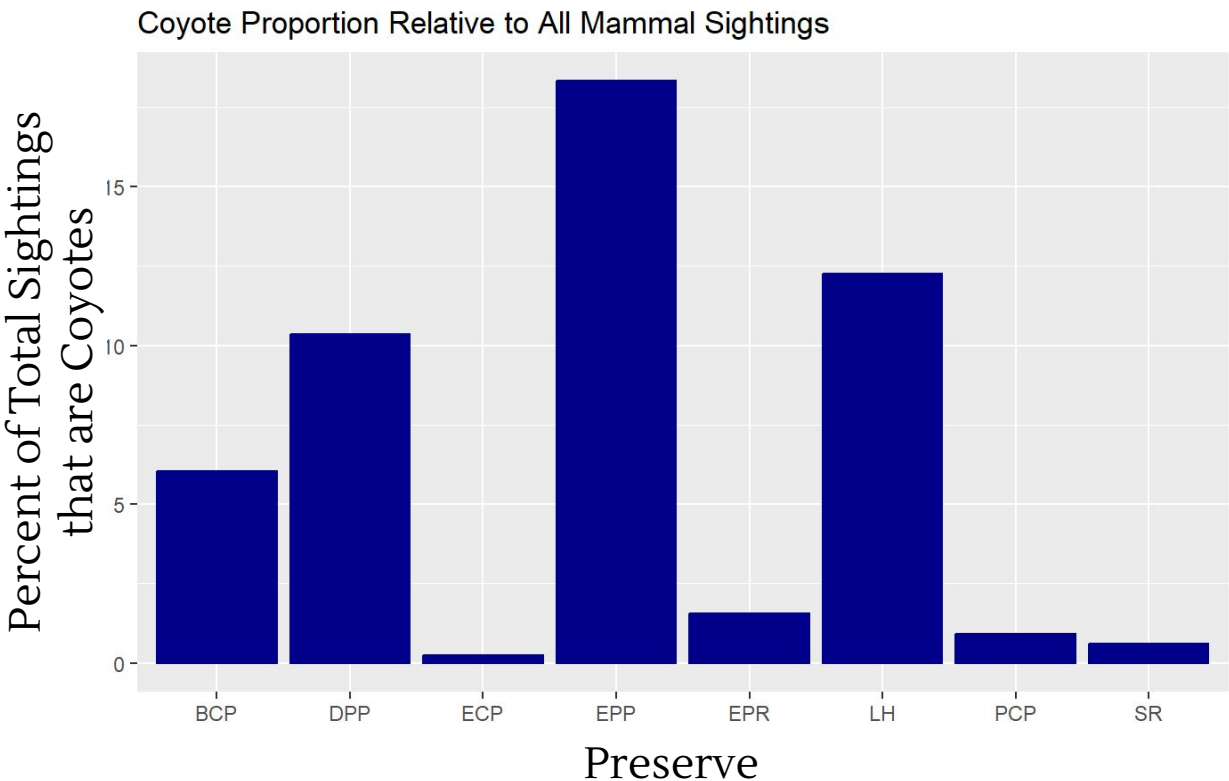
EPP: Eagle Peak Preserve

EPR: Eagle Peak Ranch

LH: Lillian Hill

PCP: Peutz Creek

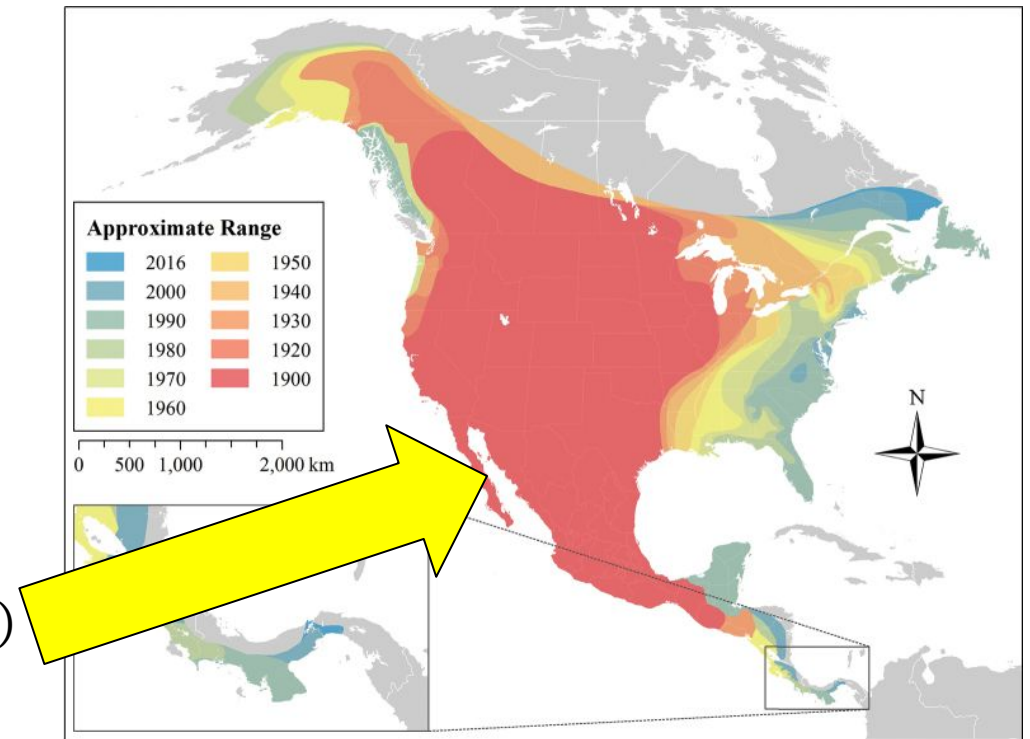
SR: South Rim



Preserve

Hypothesis 2 Not Supported: Habitat type does not correlate with more or less coyote sightings

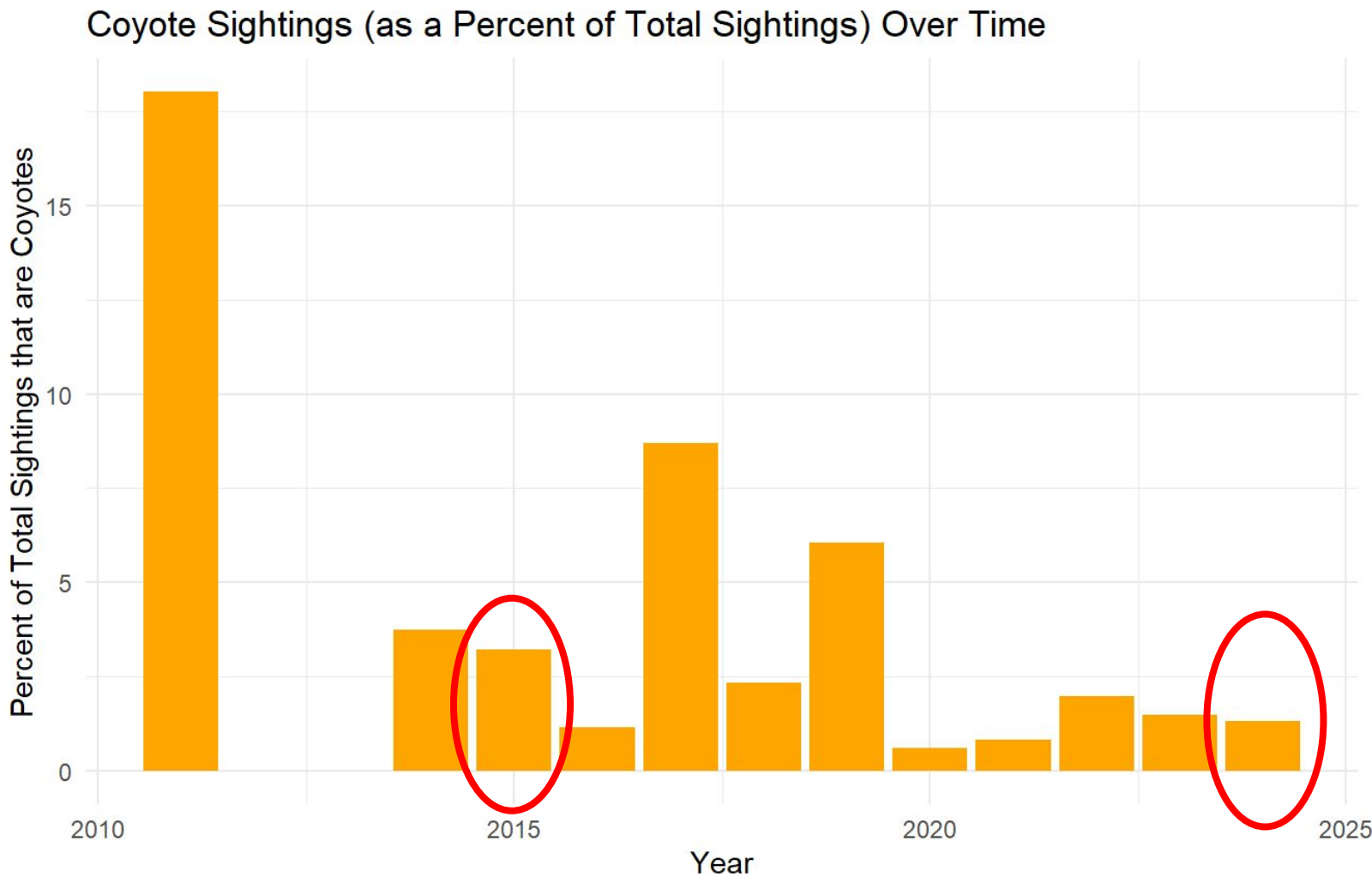
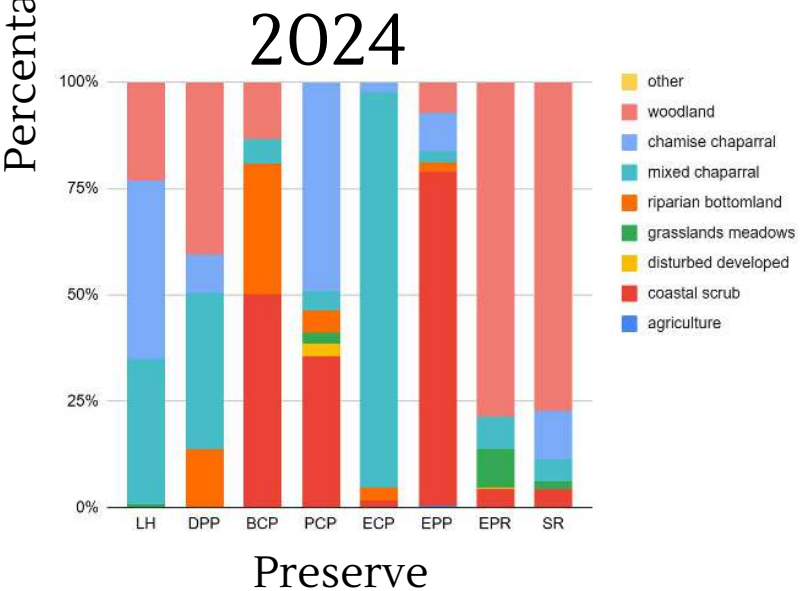
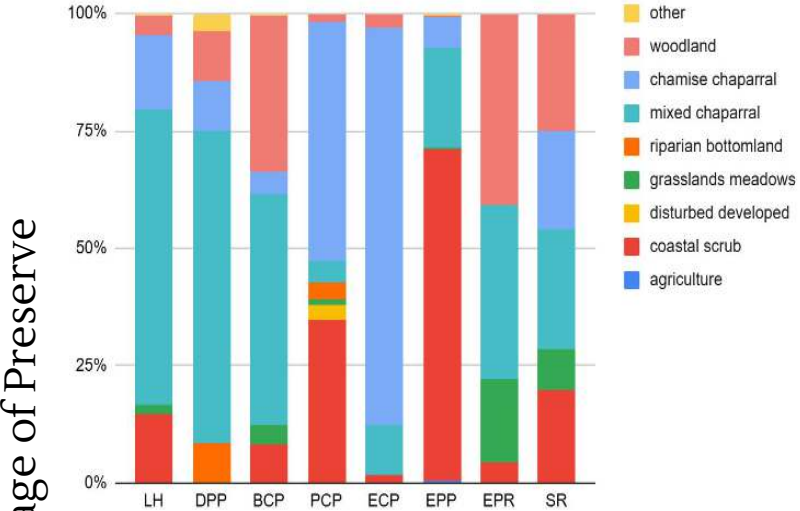
- No correlation between coyote sightings and habitat type
- This affirms that coyotes are a highly adaptable species that can use a variety of habitats (Urban Coyote Research Project)
 - Expanded across North America in the last century due to forest fragmentation and extirpation of larger predators (Hody & Kays, 2018)



Hypothesis 2: Habitat

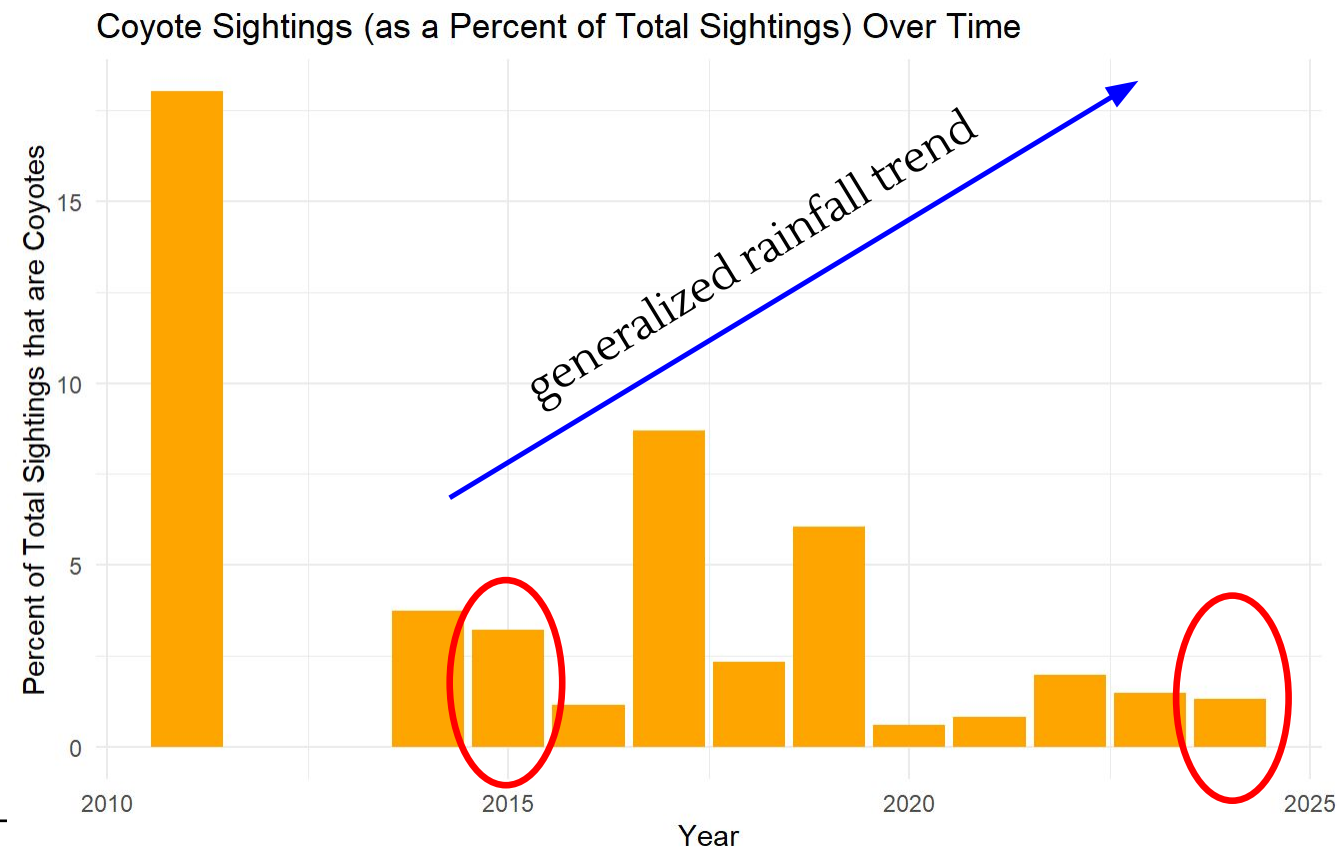
Proportion of Different Habitat Types Per Preserve

2015



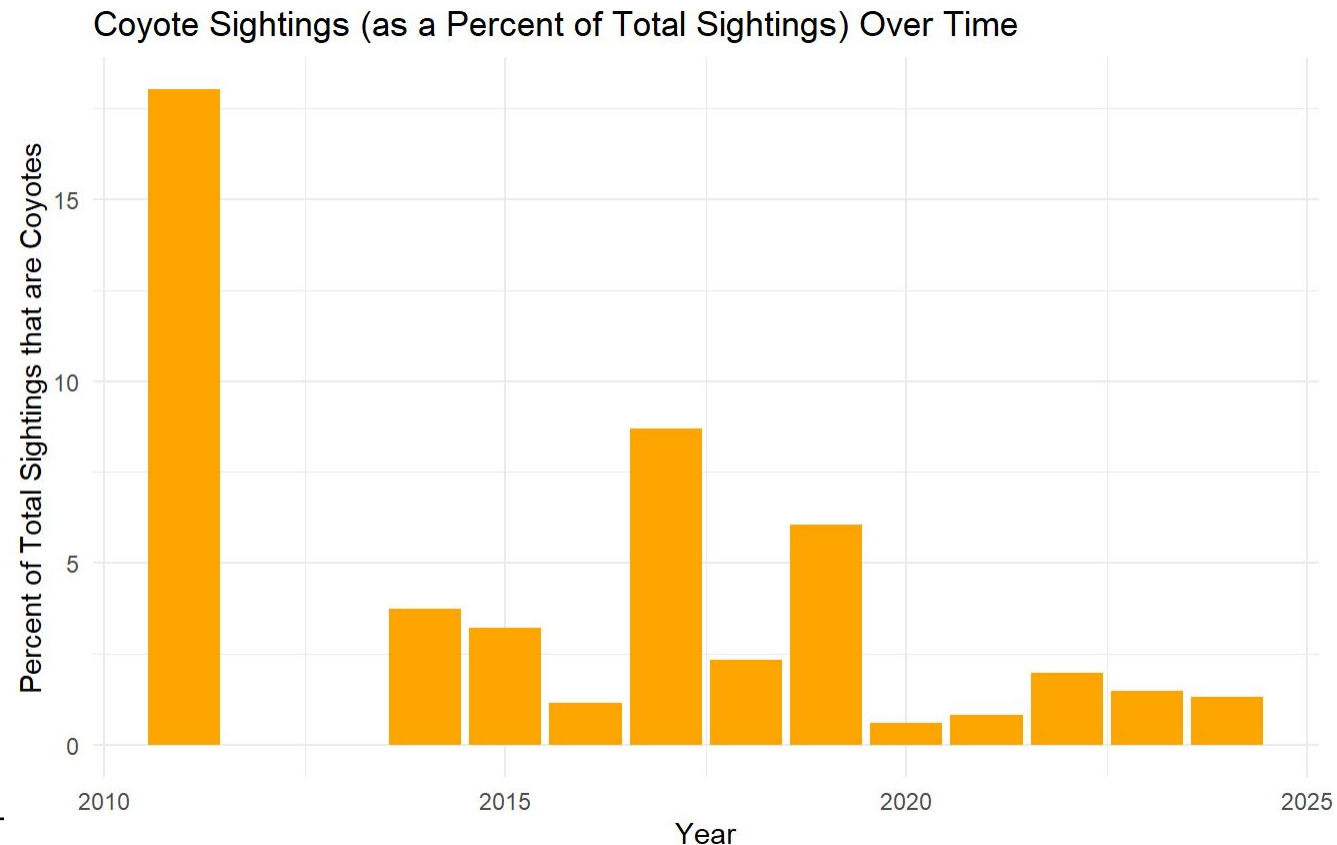
Hypothesis 2 supported: Decline in chaparral corresponds to a decrease in coyote sightings

- Shrinkage in most viable chaparral habitat may have caused populations to decline from 2015 to 2025
- Correlation might be due to changes in rainfall rather than habitat loss since coyotes are habitat generalists



Hypothesis 3 & 4: Development and disease negatively impact coyote populations

- Development destroys grassland, coastal sage scrub, and chaparral habitat for coyotes and prey.
- Development and urban sprawl lead to habitat fragmentation.
 - Limits solitary individuals with larger ranges
 - Reduces genetic diversity by isolating populations → increased disease risk*
- *Note that the greatest source of coyote mortality remains humans, not disease.

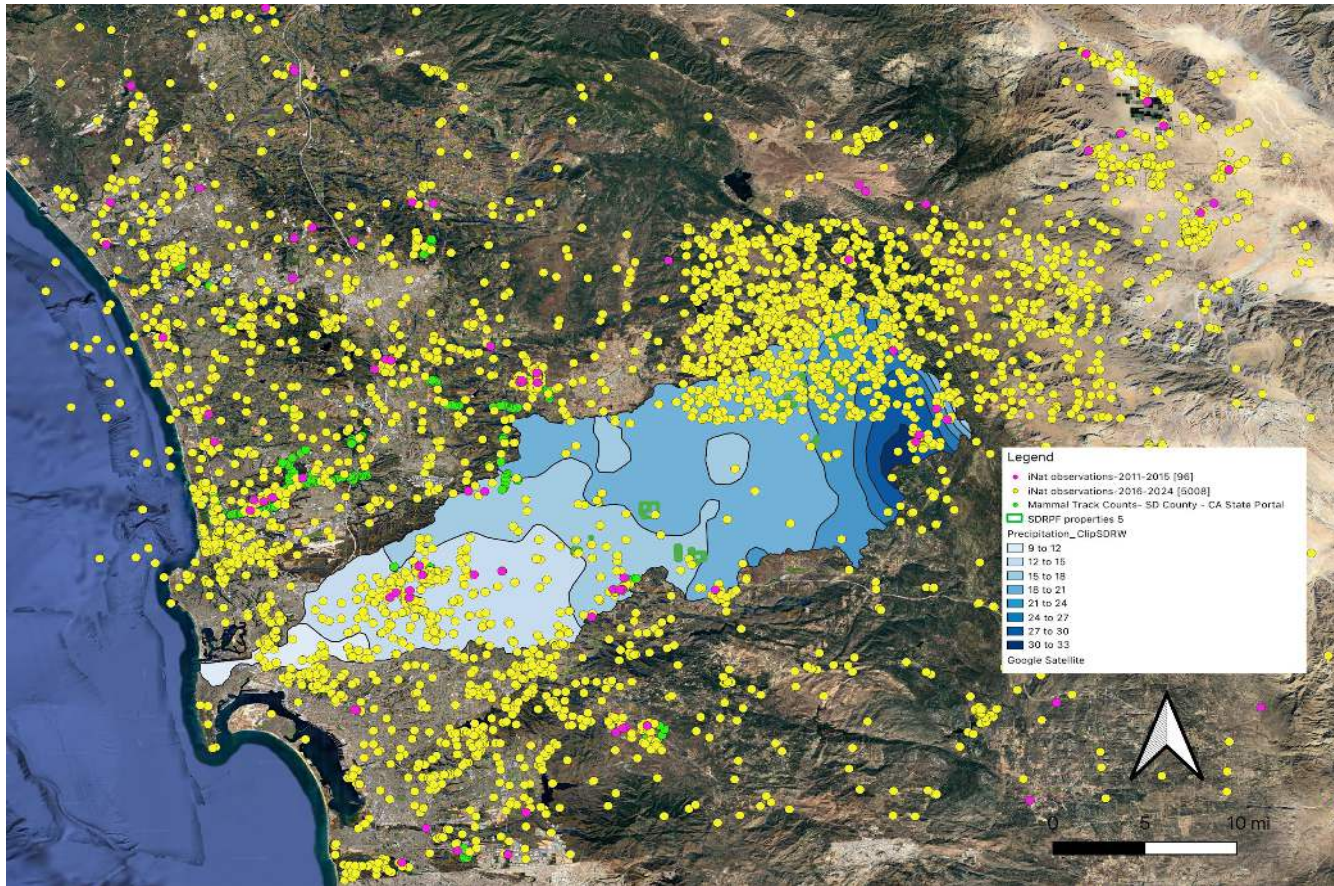


Conclusions

- Rainfall influences coyote populations in a number of ways:
 - Increased access to drinking water
 - Decreased wildfire risk
 - Long term impact: decreases in open, arid chaparral habitat preferred by coyotes
 - Additionally, development and urban sprawl continue to harm coyote populations
 - Limits to home ranges
 - Population isolation and reduction in genetic diversity
 - Increased contact with humans/vehicles
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Future Directions

Coyote Sightings in San Diego Overlaid with Annual Precipitation Level



- Future research: Are coyotes “moving out” of their native habitat?
 - Coyotes might adapt to live in urban areas where there is increased access to food and water.
 - They also might be migrating westward, closer to the ocean, where there appears to be less annual rainfall.
- Urban camera traps and sighting data would help us compare urban vs. rural coyote populations over time.



THANK YOU!



Sources:

- [Urban Coyote Research Project](#)
 - <https://iere.org/what-disease-do-coyotes-carry/>
 - <https://pubmed.ncbi.nlm.nih.gov/11310882/>
 - <https://pmc.ncbi.nlm.nih.gov/articles/PMC5974007/>
 - <https://link.springer.com/article/10.1007/s004420000448>
 - <https://www.sdcwa.org/your-water/reservoirs-rainfall/rainfall/>
 - www.drought.gov/sectors/wildfire-management
 - <https://news.ucsb.edu/2024/021337/extreme-drought-hits-grasslands-and-shrublands-harder-anticipated>
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