

Micro to macroclimatic scaling effects on foundation plant species interaction with vertebrate protégé species.

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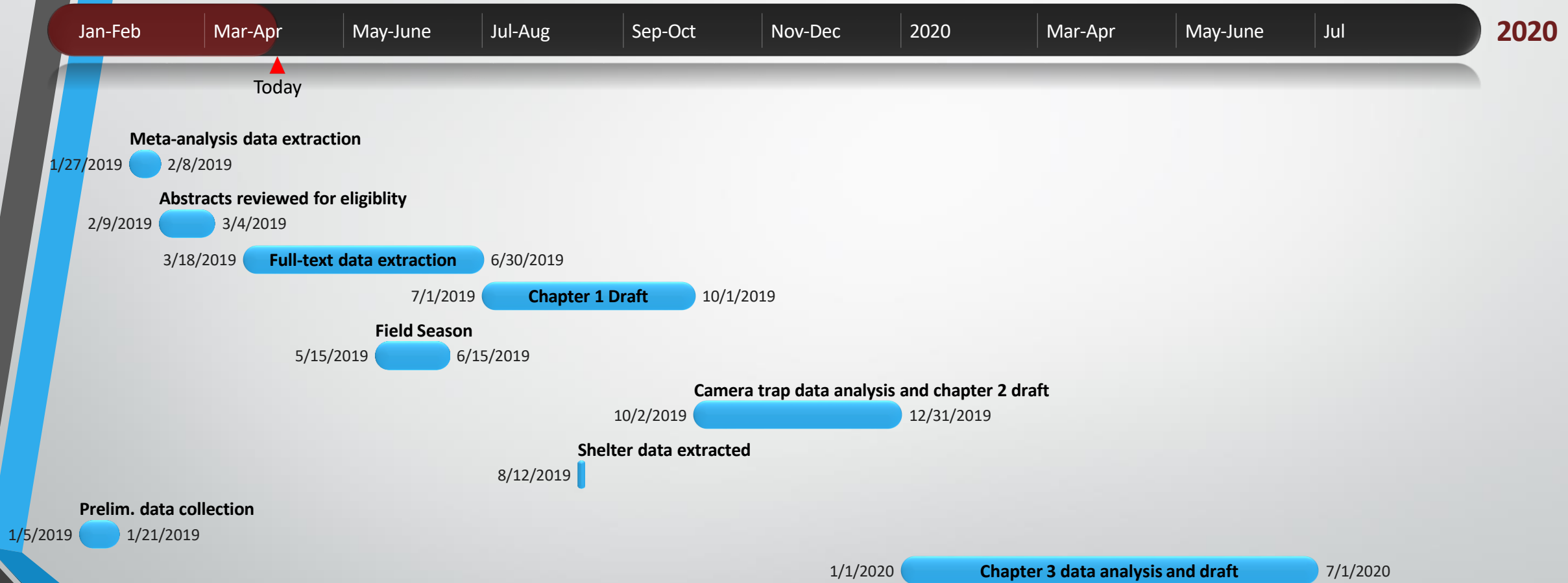
Progress Report

Spring 2019

Summary

Chapter	Title
1	A picture is worth a thousand hours: a systematic review of camera trap papers to test for reported sampling effort.
2	Plant-animal interactions and microclimate.
3	The importance of microclimatic refuges in deserts via shelters.

Timeline



Background

- Competition switches to facilitation under stressful environmental conditions-SGH (Bertness and Callaway 1994).
- Climate as a stressor is typically not explored, nor reported properly.
- Drylands are home to many, rare endemic species.
- For small animals, deserts are extremely heterogeneous at fine scales.
- Thus, climate data are needed at a macro and micro scale.



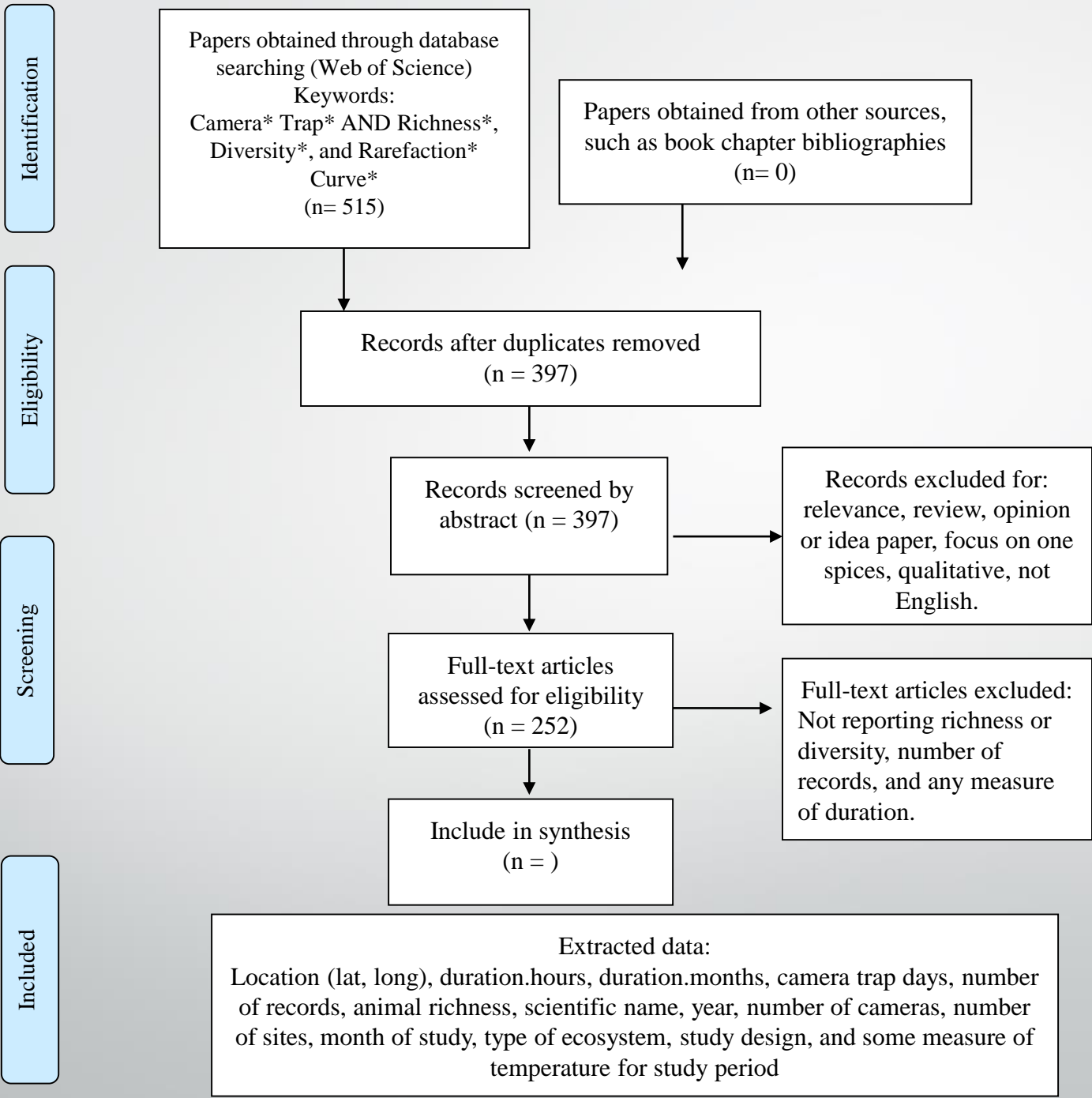
Ephedra californica

CH1: A picture is worth a thousand hours: A systematic review of camera trap papers to test for reported sampling effort.

Purpose: To Identify the relevant literature using camera traps to examine species richness and diversity as an index of sampling effort.

Questions:

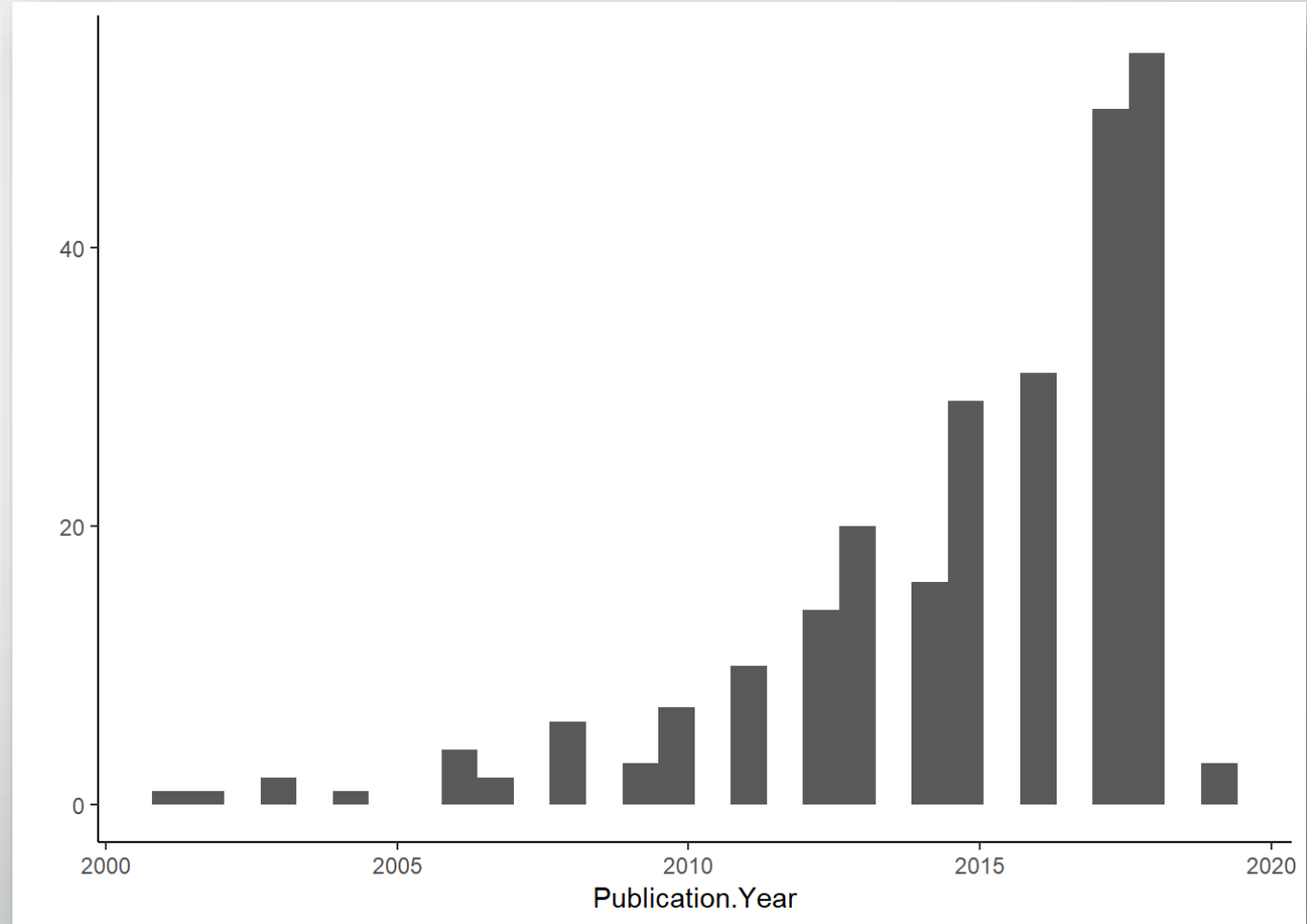
- How many hours, days, or months are needed to estimate species richness and diversity in a given ecosystem using a camera trapping tool?
- What taxa are usually recorded?
- Does the temperature of the study period function as a covariate when predicting species richness?



PRISMA diagram (Moher et al. 2009). Keyword search done on January 27th, 2019.

Preliminary Results

- 515 studies were selected
- 397 when duplicates were removed
- Most papers were wildlife monitoring or agricultural studies
- Data is being extracted from 252 articles

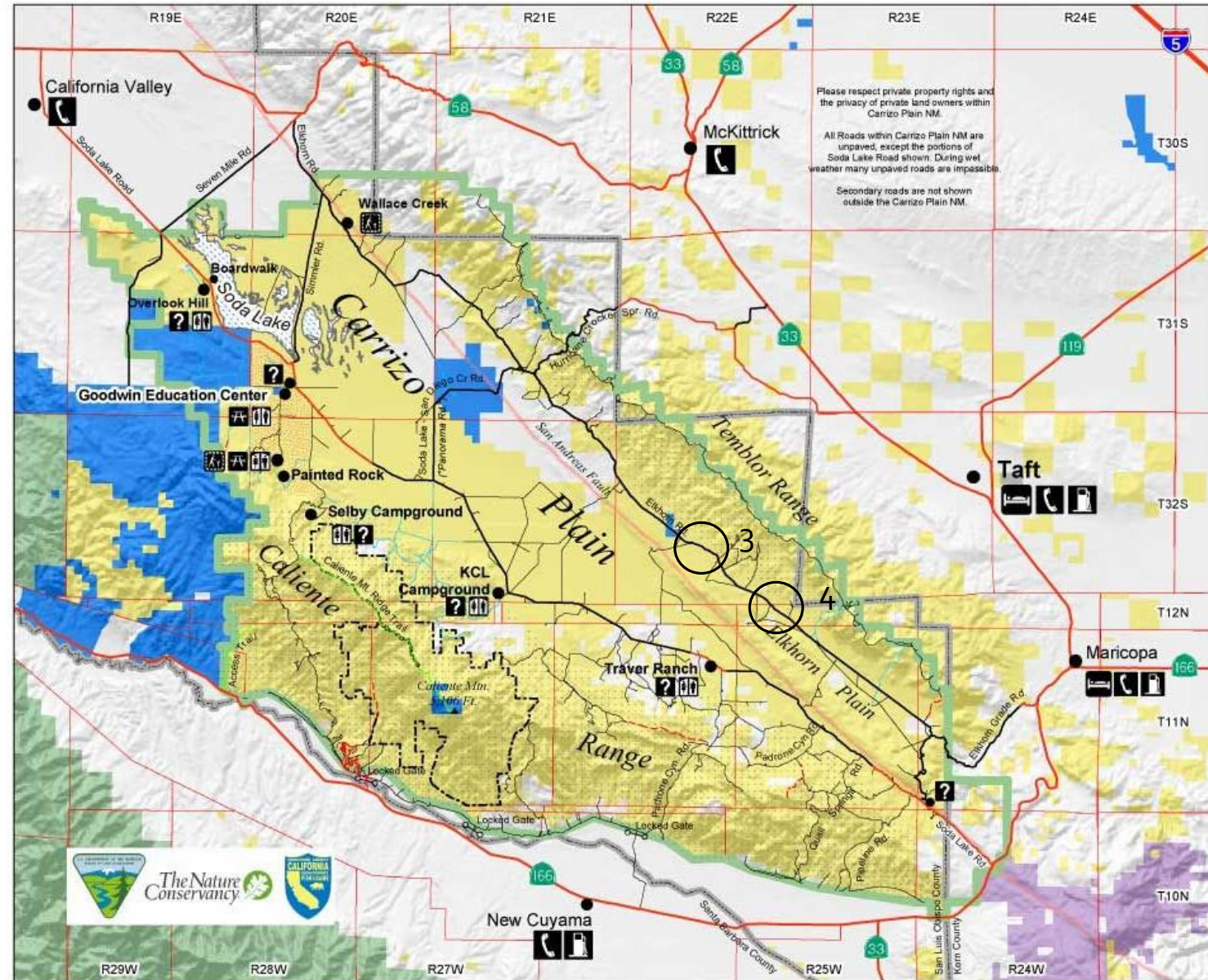


CH2: Plant animal interactions and microclimate.

Purpose: To examine whether animal association patterns with shrubs are explained by microsite level fluctuations in temperature and light.

Hypothesis: Shrubs act as thermal refuges for many desert animals by reducing temperature, reducing the amplitude of variation in microclimate, and reducing solar radiation.

Carrizo Plain National Monument

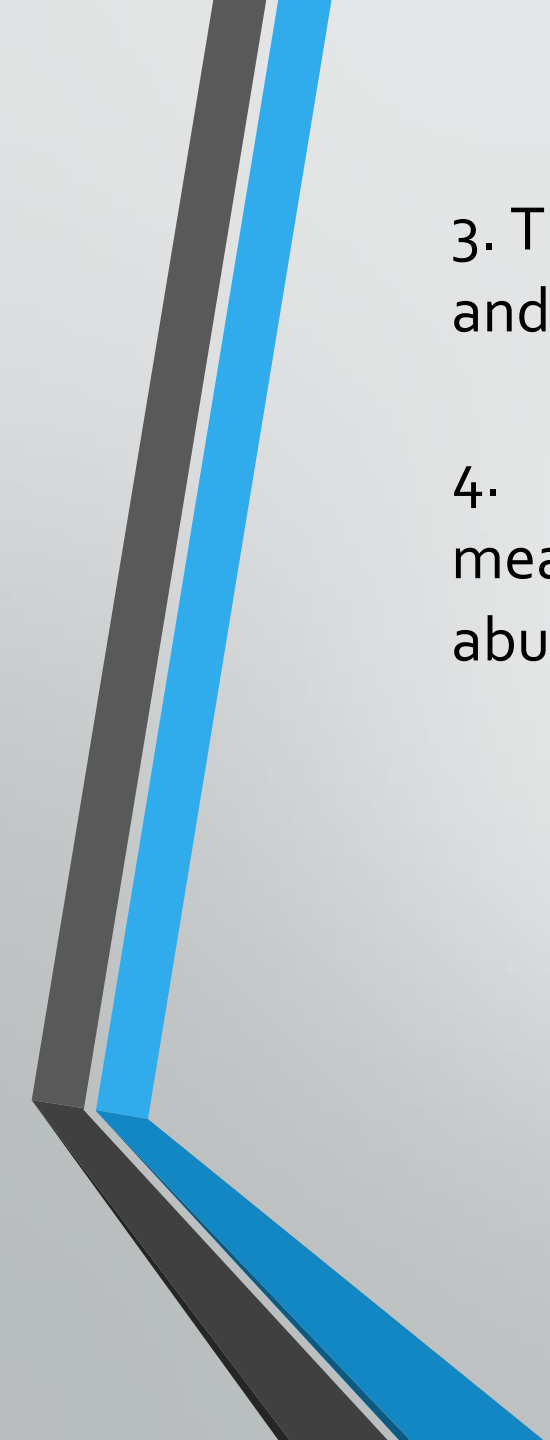




1. There are more animals associated with shrubs relative to open, non-canopy sites and the strength of this relationship increases with micro-environmental stress.



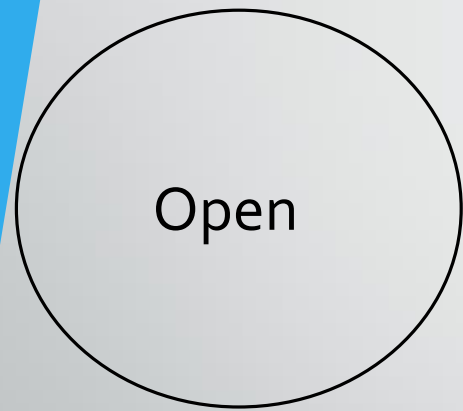
2. Shrub size predicts the strength of association between shrubs and protégé animals.



3. The facilitation refuge effect may be enhanced between abundance and richness of animal populations.

4. Microclimatic (ones site) and mesoclimatic (multiple sites) measures are more significant predictors of fine-scale animal abundances relative to the macroclimate of the region.

Methods



3 meters



3 meters

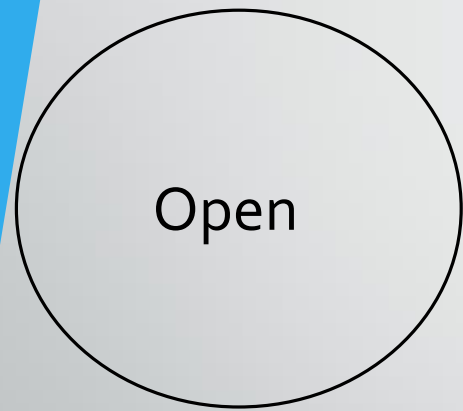


- 2 sets of temperature pendants
- Better than logger: Not chewed by animals
- 30 minute intervals
- One in soil
- Ones secured to a peg (with zip ties), 2-3 cm above ground for air temperature



Onset HOBO temperature and light pendants, 8K

Methods



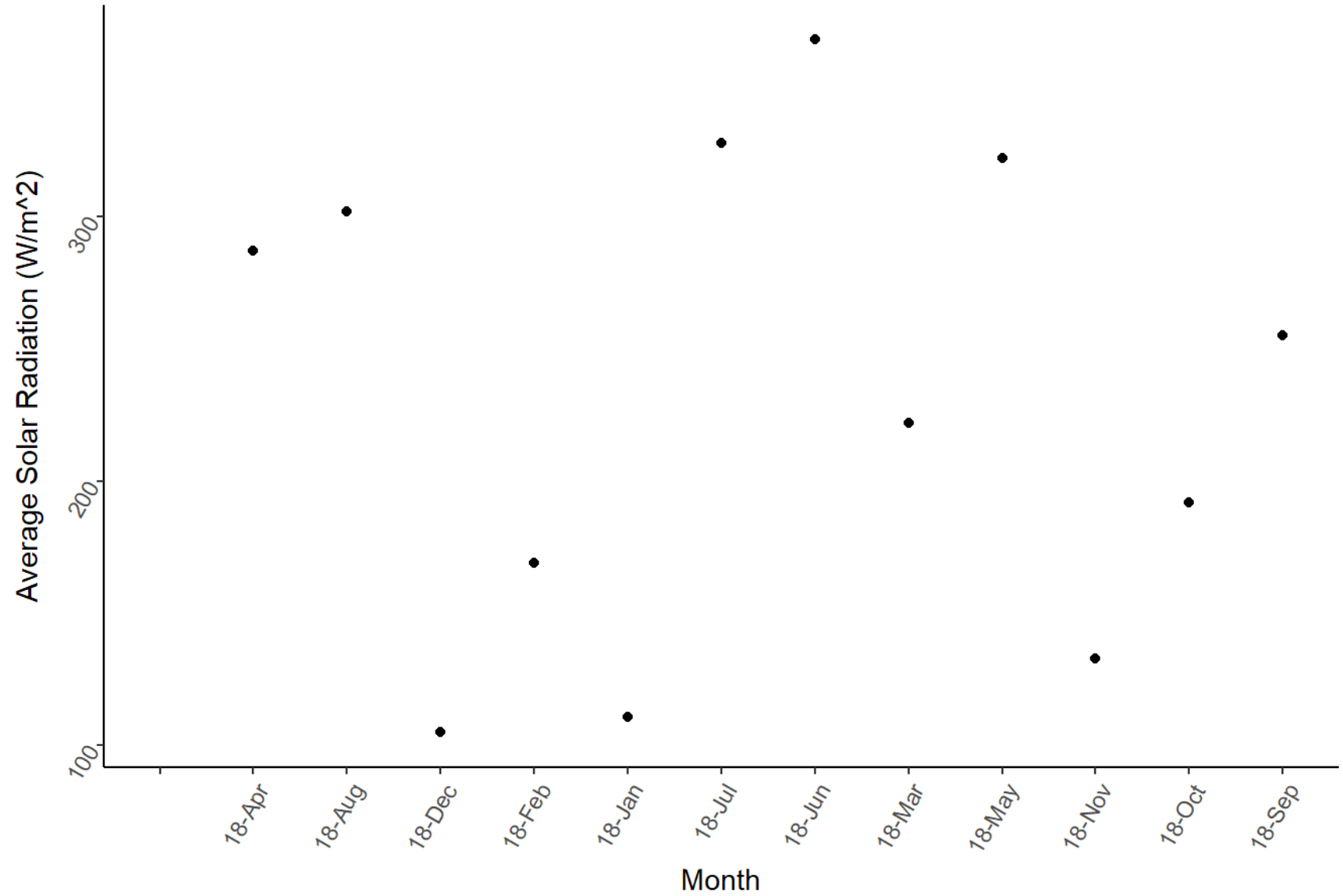
3 meters

Preliminary Results

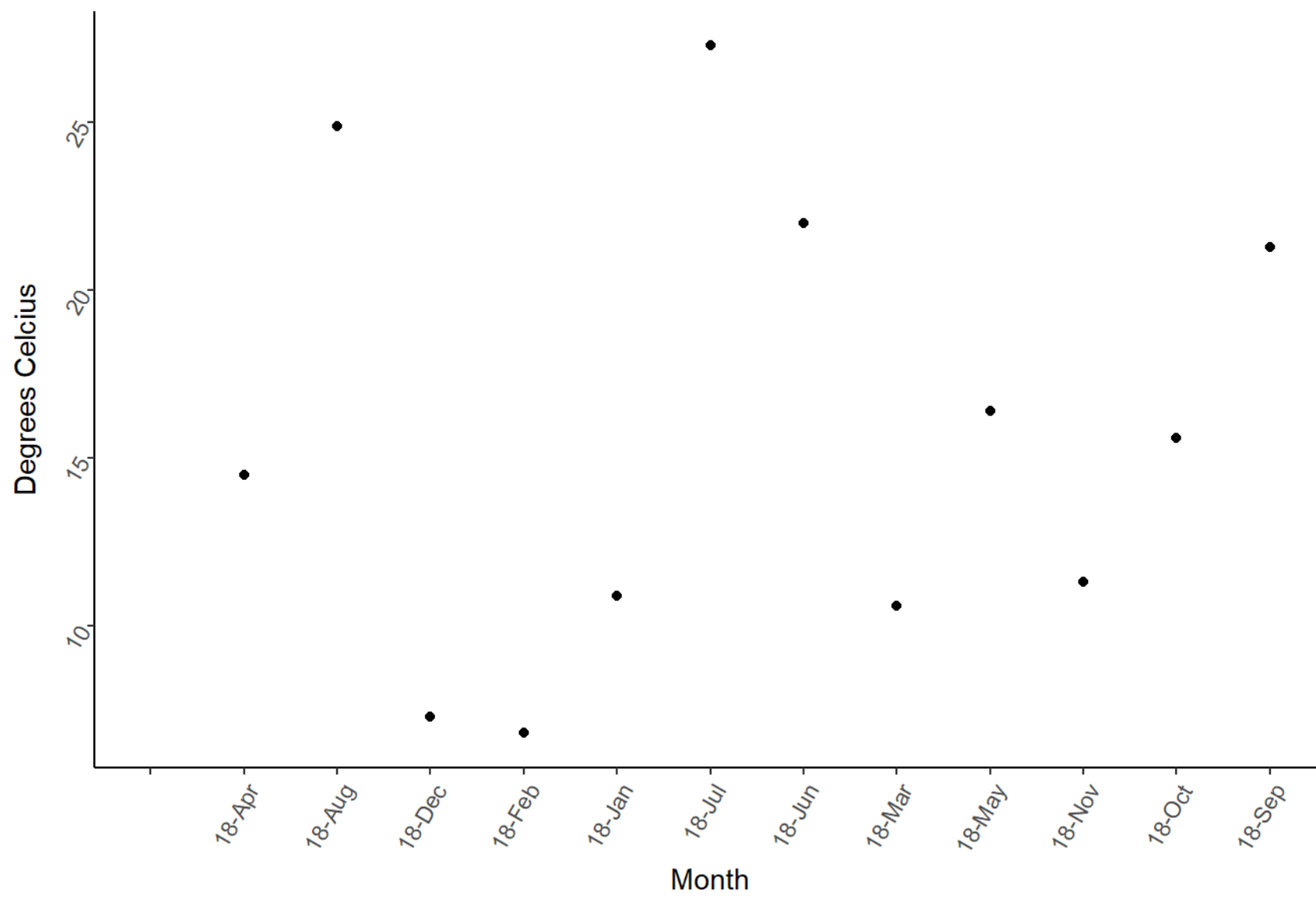


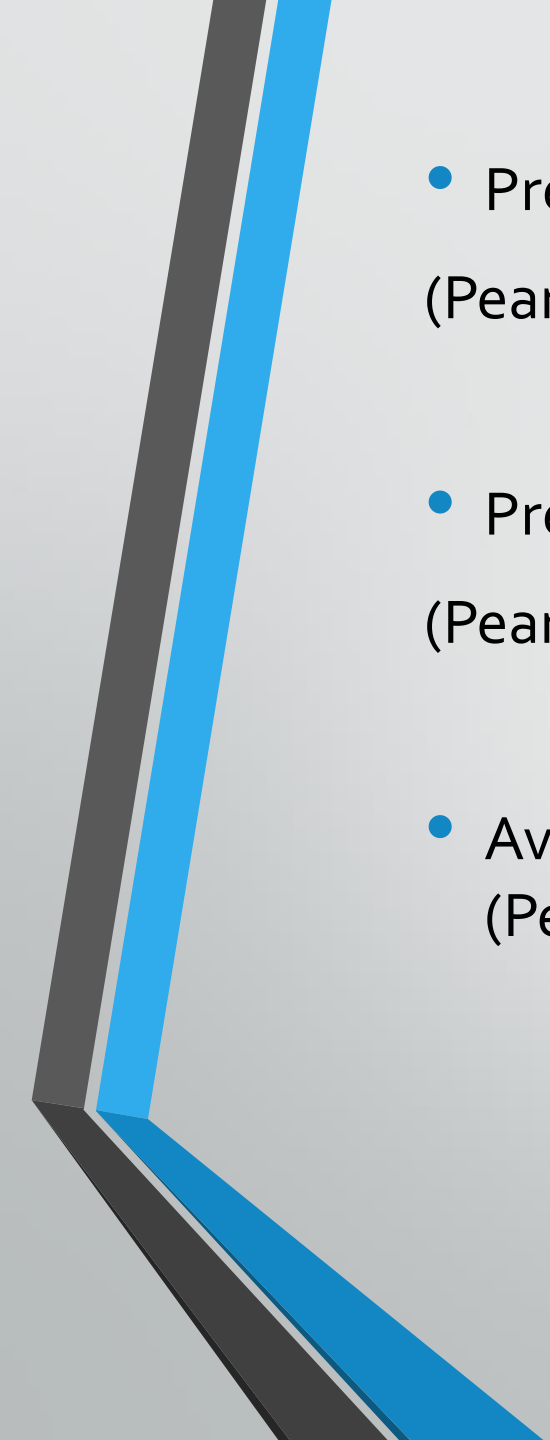
California Irrigation Management Information System (CIMIS) Cuyama weather station

Average Monthly Solar Radiation



Average Monthly Temperature



- 
- Precipitation was negatively correlated with average solar radiation (Pearson's Correlation, $cor = -0.28$, $p\text{-Value} = 0.37 > 0.05$).
 - Precipitation was negatively correlated with average air temperature (Pearson's Correlation, $cor = -0.48$, $p\text{-Value} = 0.11 > 0.05$)
 - Average air temperature was negatively correlated with wind speed (Pearson's Correlation, $cor = -0.104$, $p\text{-Value} = 0.75 > 0.05$)

CH3: The importance of microclimatic refuges in deserts via shelters .

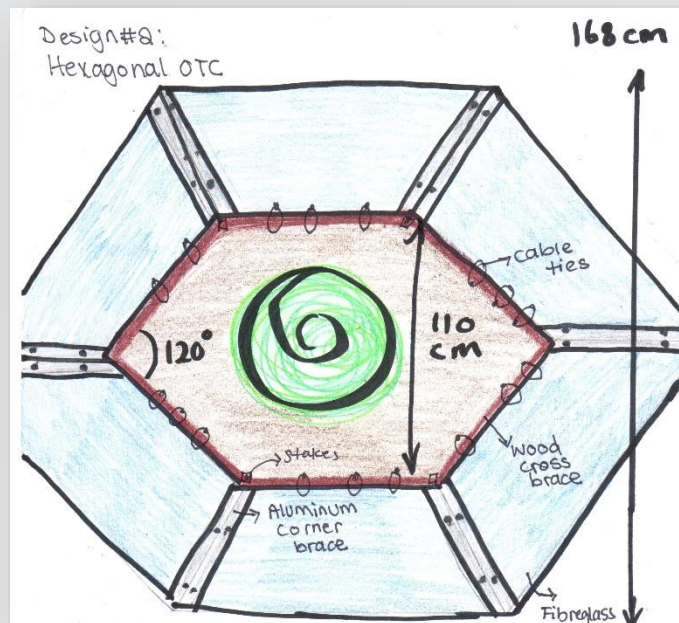
Questions:

- How does the canopy coverage of shelters differ?
- To what extent does the material and design affect temperature and light fluctuations?
- What are the implications of this study for different climate change scenarios?

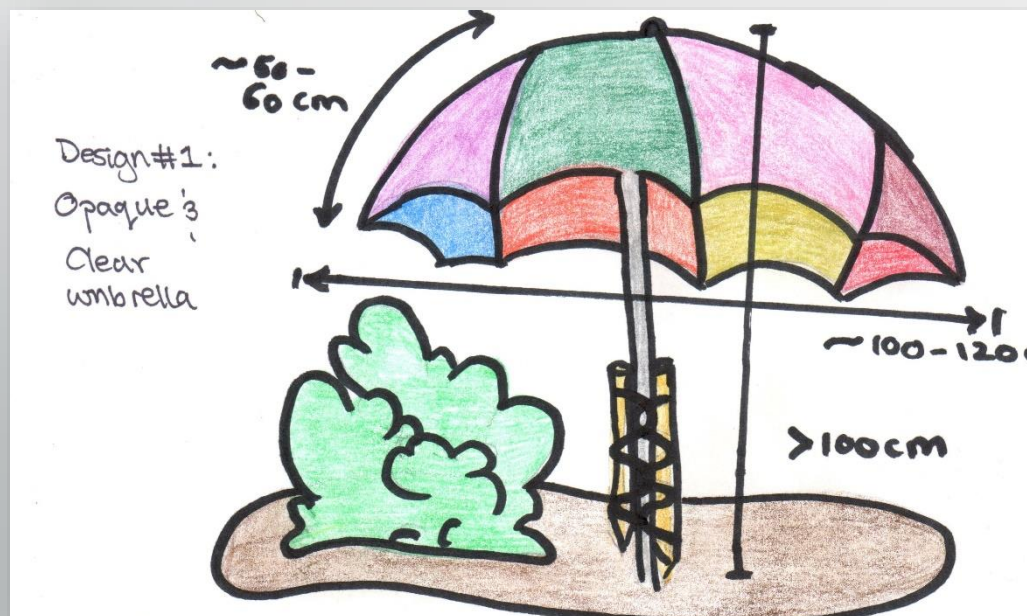


(Google Maps)

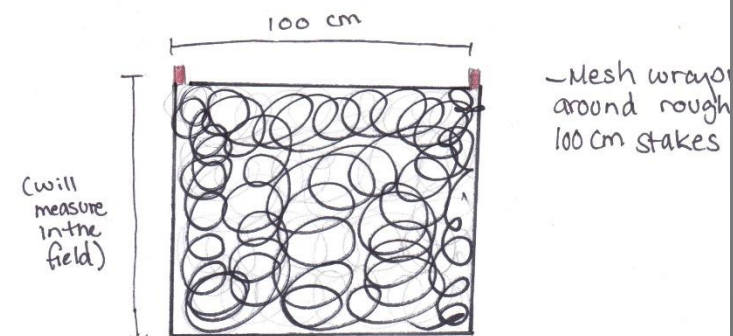
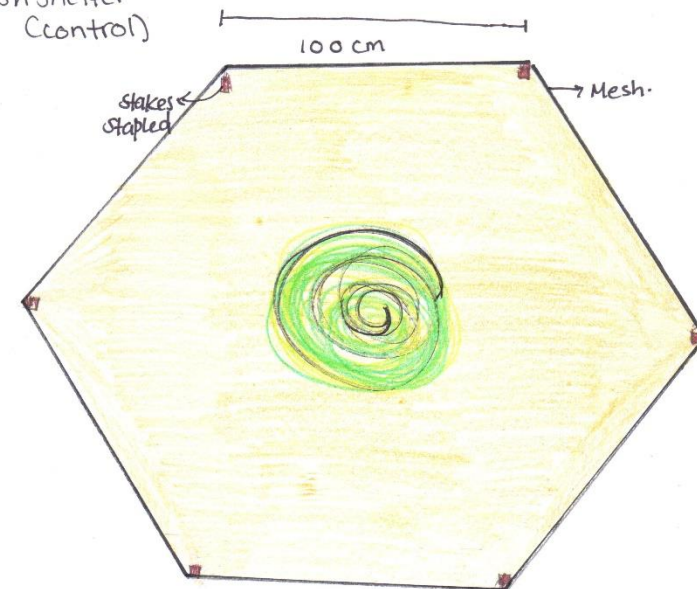
Open Top Chamber (OTC)



Umbrella opaque and clear



Design #3: Mesh Shelter Control



Mesh control

Shelter prototype



New Proposal

Change:

1. Material

2. Shape

- Flat panel x4 materials
- Or 2-3 shapes with sides and 1-2 material only
- Pan trapping

Implications

