Midterm

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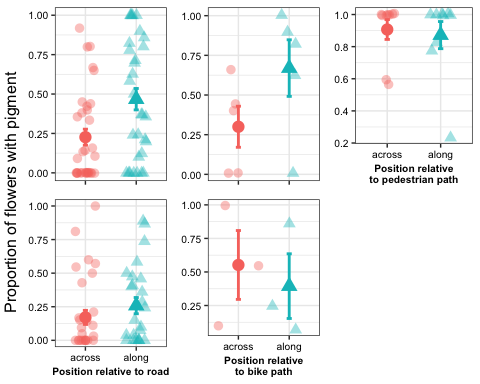
2023-05-11

## Problem 1

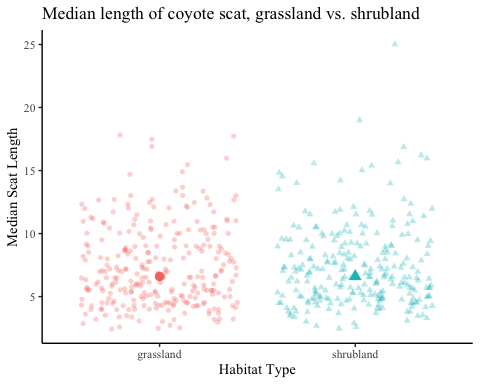
1. Biological: Ho = the phosphorus contents in the soils at the burned and unburned sites are equal. Ha = the soils in the burned and unburned sites do not have the same phosphorus content. Statistical: Ho = there is no significant difference in the mean phosphorus between the data sets. Ha = there is a significant difference in the mean phosphorus between the data sets.
2. A t-test can be used to determine if the mean phosphorus content is significantly different between the two areas.
3. To perform a successful student’s t-test, we assume that the data sets are evenly distributed and have an equal variance.
4. If the data sets had an unequal variance we could perform a Welch’s t-test.
5. The null hypothesis states that there is no difference in phosphorus content between the burned and unburned sites. 34 soil samples were collected and there was found to be a significant difference in phosphorus content between burned and unburned sites, therefore the null hypothesis was rejected (two-sample two-tailed t-test, t(66) = 2.5, ⍺ = 0.05, p = 0.014)
6. Ho = the mean phosphorus content in the soil is equal before and after the fire. Ha = there is a difference in soil phosphorous content before and after the fire.
7. I would perform a two-sample t-test to compare the mean phosphorus content of the soil before and after the fire in each survey site in order to determine if there is a significant difference in the means.

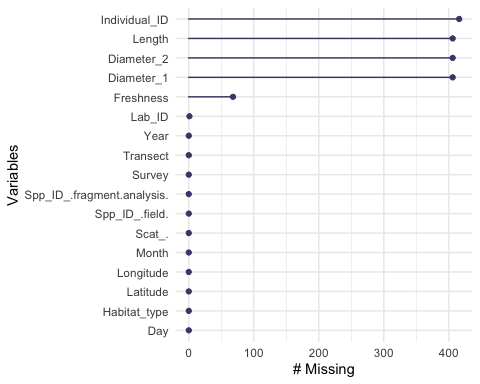
## Problem 2

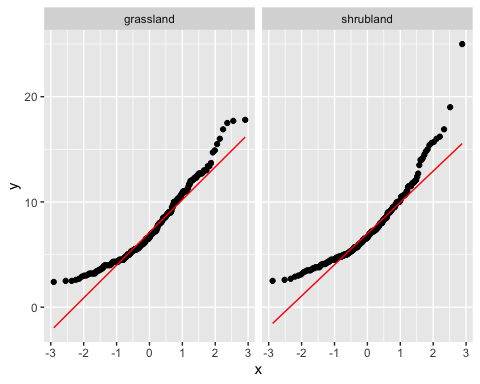
1. Roads may hinder pollinator movement and limit pollination of plants across and along roads. In this study, a fluorescent pigment is used as an analogue for pollen to track the visitation of flowers by pollinators. Generally, flowers across a road or bike path are less likely to be visited by pollinators than flowers along a road or bike path. The pedestrian path seemed to have little effect on the rate of pollination. Habitat corridors could help pollinators cross roads and bike paths to reach flowers. Promoting alternative methods of transportation and reducing the number of cars on the road could also reduce pollinator deaths by collision and allow for safer road crossings.



## Problem 3



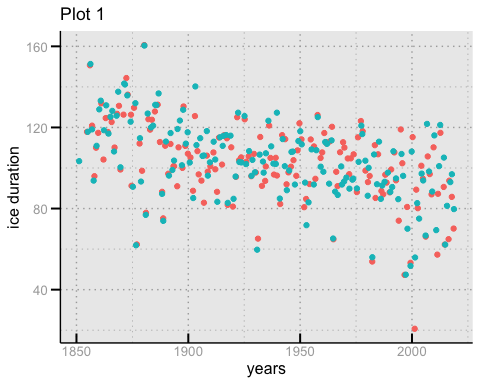
1. 
2. Using the Mann-Whitney U test can help us determine if the median scat length is the same between the two habitat types. Our grassland and shubland data sets are random samples with similar distributions, so this test should be accurate comparing the medians of the two data sets.
3. Ho = There is no difference in median coyote scat length between the grassland and shrubland sites in the Chihuahuan Desert. Ha = There is a difference in median coyote scat length between the grassland and shrubland sites in the Chihuahuan Desert.



##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: coyotes\_test$Grassland and coyotes\_test$Scrubland  
## W = 35154, p-value = 0.9486  
## alternative hypothesis: true location shift is not equal to 0

1. The null hypothesis is that there is no significant difference in median coyote scat length between the grassland and shrubland sites in the Chihuahuan Desert. Statistical analysis of the data sets using Wilcoxon rank-sum test shows that there is not a significant difference in the scat length and the null hypothesis is accepted (W = 35154, p-value = 0.9486)

## Problem 4



1. 