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GEOG 442

Portuguese Bend Reserve 2019 Transecting

Introduction

Rancho Palos Verdes has experienced several disturbances where coastal sage scrub (CSS) had the opportunity to reclaim once developed land. However, the same opportunity was available for exotic species which were introduced by past human activity. Competition with these species, habitat fragmentation, and urban development have continued to stain the survival of this endemic habitat. Palos Verdes has been known to have swaths of land with contrasting amounts of healthy CSS. For example, Forrester Reserve has extremely healthy CSS while adjacent areas such as Portuguese Bend Reserve are dominated by non-native grasses and forbs with pockets of CSS. The domination from these exotic species made this region an area of interest for the Biogeography lab of CSULB since Fall 2008.

Our group was tasked with transecting the Upper Portuguese Bend Reserve. This part of Palos Verdes has a high amount of invasive species dominating the landscape. The data is going to help monitor the restoration efforts and understand the actual degree of invasive species. Our team would collect fifteen different ten meter transects varying in placement among different trails. The transecting would be done in Fire Station Trail, Peacock Trail, Kelvin Trail, and Crenshaw Extension/Burma Trail. While the data does provide insight in the state of CSS, it will be compared to previous data to determine whether the CSS has made any progress regarding its health.

Hypotheses were actually made for three different comparisons of data. The first was comparing our Portuguese Data with the data taken in the same area by previous classes. The working hypothesis is: There is significant seasonal difference between our data and previous data. The null hypothesis: There is no significant seasonal difference between our data and previous data. Ulysses had an insightful idea to compare data from a ESP 330 where they transected in Forrestral Reserve. The working hypothesis is: There is a significant difference between disturbed and undisturbed areas of CSS during the same season. The null hypothesis is: There is no significant difference between disturbed and undisturbed areas of CSS during the same season. The third acting hypothesis is: There is a significant difference between disturbed and undisturbed areas in the same season of CSS. The null hypothesis is: There is not a significant difference between disturbed and undisturbed areas in the same season of CSS.

Data & Methods

Transecting tape provided to us by Professor Rodrigue was used to take fifteen ten-meter transects throughout the Portuguese Bend trails. Eight of these transects were placed parallel to the path, and the other seven were placed transversely to the path. At both ends of each transect, coordinates were gathered using GPS units also provided by Professor Rodrigue. After the coordinates were recorded, plant species were identified at every meter of the transect. If no species were present at a specific meter, it was labeled as “bare ground”. All this data will be called the Spring Portuguese Bend Data.

Professor Rodrigue provided the all collective data collected from Palos Verdes from previous classes. The raw Spring Portuguese Bend Data was added to the collective data file for future classes to continue research. The Chi Square models she provided were used to compare previous data with the data we collected. The same Chi Square models were used to make a

comparison with the data collected by our team and the data collected from ESP 330. The comparisons done through the chi square model provided statistical data that would determine whether to reject or accept the null hypothesis. The models were able to easily provide Chi Square calculated, Chi Square critical, P-Value, Effect Size, and Power.

Results

Spring 2019 Portuguese Bend Data versus Past Portuguese Bend Data

X² calculated	69.180
X² critical	9.236
P-Value	0.000
Effect Size	0.345
Power	0.999

Spring 2019 Portuguese Data versus Past Forrestral Data

X² calculated	217.506
X² critical	9.236
P-Value	0.000
Effect Size	0.662
Power	0.999

Spring 2019 Portuguese Bend Data versus Spring 2019 Forrestral Data

X² calculated	20.472
X² critical	9.236

P-Value	0.001
Effect Size	0.179
Power	0.983

Discussion

After reviewing our results of the three Chi Square analyses conducted between Spring 2019 Portuguese Bend vs Past Portuguese Bend, Spring 2019 Portuguese vs Past Forrestal, and Spring 2019 Portuguese Bend vs Spring 2019 Forrestal. We noticed that all three were significant. For Spring 2019 Portuguese Bend versus Past Portuguese Bend the Calculated Chi Square of 69.180 is greater than the Critical Chi Square of 9.236, Showing its significance. Since the p-value is 0.000 it is less than the set alpha level of 0.10; that furthers our decision of the results being significant. As the difference in data showed significance, the null hypothesis was rejected. These results showed a significant seasonal difference between the two separate data sets. The results of the analysis also displayed a moderate effect size of 0.345; with a very strong power of 0.999.

When comparing our Spring 2019 Portuguese Bend data and Past Forrestal data, the Chi Square analysis showed significant results since the calculated Chi Square value of 217.506 was greater than the Critical Chi Square value of 9.236. The p-value was 0.000 which is less than the alpha level of 0.10 this shows that there is a very little probability that the results are random. Due to these results, the null hypothesis stating that there is no difference between Portuguese Bend and Forrestal was rejected. What the results also showed was a strong effect size of 0.662 and very strong power of 0.999. These results shows a significant difference between the more disturbed Portuguese Bend and the more pristine condition of Forrestal. These results give us

some insight on how the two locations perform throughout the seasons and if it is disturbed or not.

The comparison between Spring 2019 Portuguese Bend and Spring 2019 Forrestral data also showed significance. The Calculated Chi Square was 20.472 and the Critical Chi Square was 9.236. Since the calculated is bigger than the critical it shows significance. The effect size was pretty weak at 0.179, meanwhile the power is 0.983. During our time transecting at Portuguese Bend, most of the area was disturbed compared to the Forrestral location.

Conclusion

The Chi Square calculated for all three comparisons are bigger than the Chi Square critical which means we can reject the null hypothesis. Rejecting the null hypothesis means there is significant seasonal difference between our data and previous data. The first two comparisons have a decent effect size but the third comparison has a weak effect size. A decent effect size shows how the statistic values are substantial in relevance when making a comparison.

The second comparison shows the degree of healthy the CSS is in Forrestral Reserve because it uses to Portuguese Bend as a reference point. Portuguese Bend's lack of variety is a difficult to ignore with the vast yellow forests of Black mustard. While the Forrestral Reserve has a healthy variety of CSS which has created a lot of curiosity for ecologists.. This comparison provides statistical proof of the difference in degree of health between the two areas which show two extremes of health.

Considering how there are significant seasonal changes between data collections, it is definitely recommended for future classes to monitor the Upper Portuguese Bend. The extent of invasion from exotic species must be closely monitored. The forrestral reserve contrasts this

condition providing valuable insight on what to strive for in restoration efforts. Ultimately, this information will prove valuable when monitoring restoration sites.

References

Predecessors Data: F/08: GEOG 442 and GEOG 447, F/11: GEOG 442, F/14: GEOG 442, F/14 Group project, GEOG 442, F/15: GEOG/ES&P 330, S/16: GEOG/ES&P 330, F/17 GEOG/ES&P 330, S/18 GEOG/ES&P 330, F/18 GEOG/ES&P 330, and S/19 GEOG/ES&P 330