Spatial Distribution of Yellow Star Thistle as it Varies with Slope Aspect at Fairfield Osborn Preserve

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Introduction

Yellow star thistle (*Centaurea solstitialis*) is an invasive species and has been taking over 15 million acres of grassland in California where 57 out of 58 counties are infested with yellow star thistle. Yellow star thistle is known to grow well in areas of full sunlight; and since south facing slopes receive more solar radiation than north facing slopes, we hypothesized that there would be higher densities of yellow star thistle on south facing slopes. To determine the spatial distribution of yellow star thistle on north and south facing slopes, we investigated an area at the Fairfield Osborn Preserve by taking GPS coordinates along north-south transects, and categorized each immediate area with a level of high, medium, low, or no density. Our data provides evidence of yellow star thistle growth patterns and could be used as a tool for invasive species management.

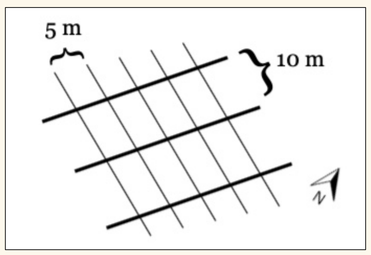
Materials & Methods

Our research was conducted in the north region of the Fairfield Osborn Preserve because of the large presence of yellow star thistle fields found within hillslope grasslands near the top of Sonoma Mountain. We selected an area to survey on north and south slopes around the paths of the Ridge Loop Trail.

- Located north and south facing slope of yellow star thistle
- Took perimeter of area of both slopes with Gaia GPS application
- Took transects every 10 meters to the east along a north-south transect
- Took points from north to south with Coordinates GPS application every 5 meters recording density level
- Determined high, medium, low, and no density approximately 1 square meter around each point

Our final area of yellow star thistle that we surveyed included 8 total north-south transects per slope and covered approximately 1.85 acres of land.

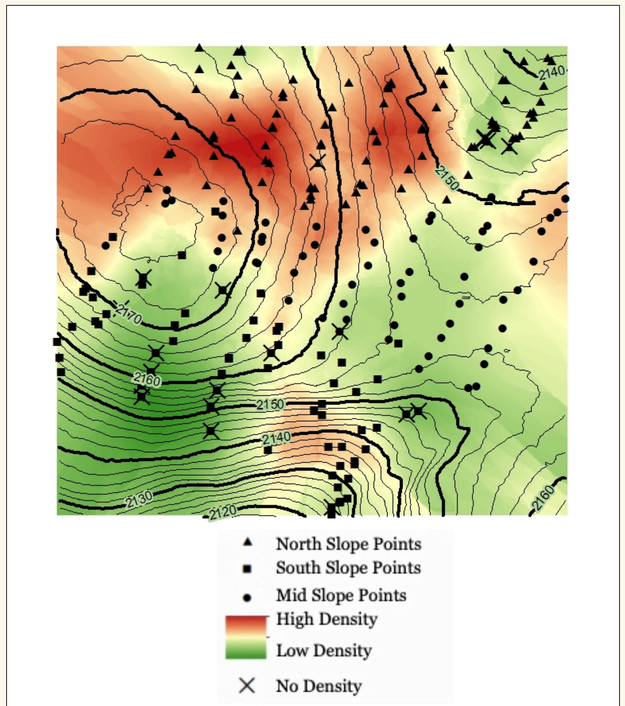
Transect Illustration



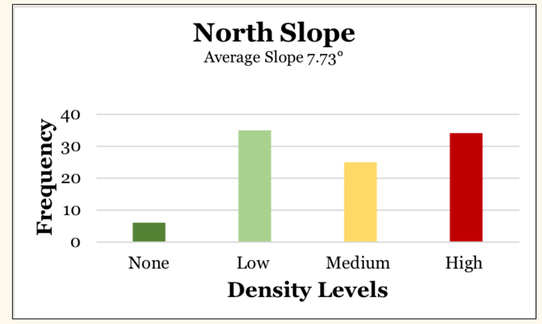
Levels of Density

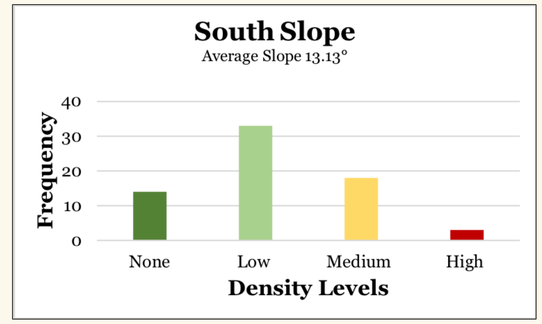
High Density | **Medium Density** | **Low Density** | **No Density**

Density of Yellow Star Thistle with Slope



Results





Comparison of frequencies of different densities at north and south slopes

Conclusion

- The north facing slope contained more areas of highly dense growth.
- The south facing slope contained less areas of highly dense growth.
- Observed a possible correlation between yellow star thistle growth and slope steepness.
- Correlation could be due to slope characteristics:
  - South slopes are drier and more steep due to increased solar radiation
  - North slopes contain more soil moisture and are less steep because of decreased solar radiation

Overall, the research conducted helps to predict and prevent future growth of yellow star thistle. Future research could be done by testing north and south slope's soil chemistry to determine if growth of yellow star thistle is affected by soil properties.

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References

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