



# Disturbed Areas are Gateways for Non-Native Invasive Species in Coastal Sage Scrub



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## Introduction



Figure 1. 1928 aerial photograph of Upper Filiorum with disturbed areas shown.

The Palos Verdes Peninsula Land Conservancy (PVPLC) manages over 1200 acres of land that they want to restore to the original coastal sage scrub (CSS) by taking out the non-native invasive plant species and reestablishing native plants. Such effort will benefit the local environment, plants, and native animal species such as the California Gnatcatcher and the Western Pygmy Blue Butterfly, the smallest living butterfly in North America (Dalkey 2008).

The purpose of my research was to see the effect of past disturbances on native species of plants in those areas. Many of the areas that are managed by the PVPLC have been taken over by non-native species and will take a tremendous amount of effort to restore. Habitats supporting threatened native animal species have become a concern (Dalkey 2008). The PVPLC is conducting research to determine if native plants will come back on their own, following many years of plowing and farming or, if human intervention is needed in order to restore the native species.

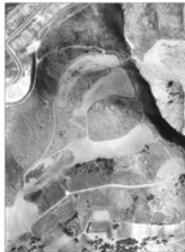


Figure 2. 1980 aerial photograph of Upper Filiorum with disturbed areas shown.

## Materials and Methods

In order to investigate the areas and parcels we surveyed, we used two different approaches: lab work and field work. While conducting lab work, we looked at satellite images to decide where to go in our sites. We also looked at aerial photographs that were taken over several decades dating back to the 1920's and used them to examine the differences between the areas over the years. We selected specific sites for field investigation. We then collected field data, including percent coverage, vegetation transects, and photographs, and analyzed the differences between the indigenous and the non-native plant species in the region.

In the field, we took measurements of lemonade berry (*Rhus integrifolia*) while searching for the largest individual plant we could find. The identified plants were categorized into groupings of indigenous or non-native species. We also collected specific GPS waypoints in our study sites to determine the exact boundaries of each parcel. This information was then used to determine whether or not indigenous species resided within the boundaries of our study sites. Finally, we conducted transects to measure the percent cover of native plants in a given area.



Figure 3. 2006 satellite image of Upper Filiorum with the disturbed areas unnoticeable in region.

Figure 4. A 2006 satellite image of Upper Filiorum with the map of the Palos Verdes Peninsula.



Figure 5. 2006 satellite image of Upper Filiorum with digitized disturbed areas shown with no green vegetation available in plowed areas.

## Results

Considering floral species within an area, all five parcels which we examined in the Upper Filiorum area had similar results. Based on qualitative field assessments, the final ratio of non-native versus native plants was 95%-98% in favor of non-native plants. The native plants that were in the plowed sites consisted of California bush sunflower (*Encelia californica*) and *R. integrifolia*.

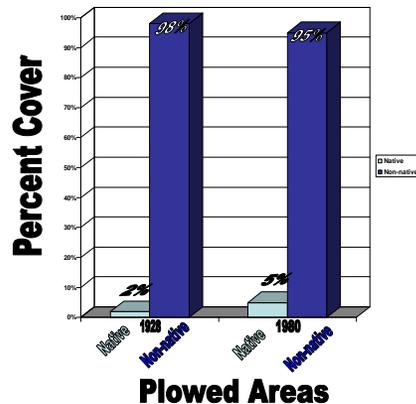


Figure 6. A graph showing the diversity of native and non-native plants living among each other in the PVPLC.



Figure 7. Joel Rojas, Planning Director, City of Rancho Palos Verdes explaining to the GDEP group the history of Palos Verdes Peninsula. Photograph taken by Jason Hazel, 2008



Figure 8. Lemonade berry (*Rhus integrifolia*) growing in area that was once plowed in non-native infested area. Photograph taken by Ray Sumner, 2008

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## Conclusions

In disturbed areas, non-native flora dominated, but *E. californica*, and juvenile *R. integrifolia* appeared occasionally, thus demonstrating that indigenous plants might regenerate with sufficient time. Based on the qualitative analysis of the study area, there was no apparent difference in the percentage of non-native species between land plowed 30 years ago and 80 years ago. In Upper Filiorum, *R. integrifolia* seems to regenerate more readily than other coastal sage scrub species.

The results obtained from this study site should be compared with other sites on the Palos Verdes Peninsula to establish the natural recovery patterns of indigenous plants and to assess whether human assisted restoration efforts are needed. Further study is recommended into methods of successful removal of non-native perennials such as mustard (*Brassica nigra*) and fennel (*Foeniculum vulgare*) with the goal of native species restorations on PVPLC lands. A more thorough study of this area is recommended to examine the progression of recovery of the indigenous flora species. Collection of vegetation transects with specialized tools to gather more precise information about percent coverage is needed.