

The reproductive biology and life history of a rare redwood forest specialist, Dudley's Lousewort (*Pedicularis dudleyi*)

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Introduction:

- Dudley's Lousewort is a rare plant endemic to central
- California. The species distribution is limited to
- populations in the Santa Cruz Mountains and
- Monterey County, which appear to be in steep
- decline. Herbarium records indicate that known
- populations used to be much more widespread
- The life history and reproductive biology of *P. dudleyi* was previously understudied

Methods:



1) We conducted video observations of floral insect visitors, we assessed observations by visits
per species, including the duration of visit and number of plants and inflorescences visited

 The objective of this study was to collect baseline data on the life history and reproductive biology of *P.* dudleyi to inform conservation management



Results:





2) In order to determine whether *P.dudleyi* is an obligate outcrosser, we placed pollinator exclusion bags on 21 individuals from bud to anthesis, an additional 21 buds were chosen as controls in which pollinators were able to pollinate

- **3)**We did a litter removal experiment for 75 plots (half treatment, half control) in order to test if leaf litter
- negatively affects seedling recruitment in the following year
- 4) We selected 152 individuals to be monitored annually in a long term study. Lastly, we conducted a population census at Portola Redwoods State Park to gather baseline information on distribution patterns and life history

Figure 1: *Bombus edwardsii* and *B. sitkensis* were the most frequent visitors of *P. dudleyi*, visiting at similar frequencies and duration per visit. Analyses performed with the Kruskal Wallis test.



Figure 2: Each line represents a site at Portola Redwoods State Park. Most sites are experiencing a notable reduction between age class 1 and age class 2.





Age class 5: reproductively mature





Figure 4: Map of field sites at Portola Redwoods State Park.

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Figure 3: Points represent individual sites. Most sites have 0-20 age class 5 individuals with 0-50 inflorescences on site and up to 150 seedlings. Sites with a greater number of age class 5 individuals have a greater number of inflorescences and seedlings.



Figure 5: Pie charts indicate proportions of each age class growing at each site, as per the population census conducted in July 2019. Slices where numbers are not indicated are $\leq 5\%$. While many sites have a large majority of age class 1 seedlings, the results from the population census highlight differences in age classes between sites overall.

Conclusions:

According to the data collected in our population census, some sites seem to be under greater threat than other sites. Differences in age class proportions by site suggest the need for site level management. As we monitor the species through space and time we can begin to understand which age classes and sites are most fragile and how to conserve them.

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