A Flora of the Chiquito Springs Basin in the Santa Ana Mountains, California

Harrison McGowan

California State University Long Beach, Department of Biological Sciences, 1250 Bellflower Blvd., Long Beach, CA 90840

Abstract: In August 2018, the Holy Fire began in the Trabuco Canyon of the Santa Ana Mountains, resulting in the burning of 23,136 acres (Bell, 2019). The burned area contained special status taxa listed by the US Forest Service (USDA, 2005). Just to the south of the Holy Fire is my study area, Chiquito Springs, which contains several important taxa and faces fire threats. The last comprehensive Flora of this area took place in 1978, and since then the population of nearby Lake Elsinore has increased from around 5,000 to 60,000 people (Population.us, 2016). With this increase in population, the Santa Ana Mountains have seen increased road traffic, increased fire risk and intrusion of invasive plants. One way to handle these challenges is to have up-to-date Flora of both native and invasive species which can assist in quantifying the presence, location and threats posed by invasive species. My study will provide an updated Flora of the Chiquito Springs area in the Santa Ana Mountains. After three years, I have documented 96 families and 750 taxa from 2,014 newly collected and historic voucher specimens. I will use both historic and personally collected specimens to identify Highly Invasive species according to Cal-IPC's plant assessment form to determine the location and risk these plants pose to the native Flora (Cal-ipc, 2020).

Background:

Chiquito Springs is a 44 km^2 area located in the Santa Ana Mountains in the Peninsular Range of California. This area is part of the California Floristic province which is an area of high biodiversity (USDA, 2005). The National Forest Service has marked Chiquito Basin as an Area of Botanical Interest (USDA, 2005). However, the last comprehensive Flora of this area was conducted in the 1970s by Lathrop and Thorne with their Flora of the Santa Ana Mountains. In 2018 the Holy Fire burned approximately 23,136 acres including a small portion of my study area. A post-fire study was launched by the Rancho Santa Ana Botanic Garden and the CNF. 16 invasive plant species were found with 7 listed by the Cal-IPC as Tier 1 invasive species. In particular, *Tamarix ramosissima,* was one of the main beneficiaries of the burn area as new individuals were found up the many riparian washes of the Holy Fire burn area (Bell, 2019). The presence of this species is concerning as it has a high likelihood to crowd out native plant habitats. This is especially concerning for my study area of the Chiquito basin. Not only has a portion of the Holy Fire burned my study area but the area is also listed as an area of botanical interest being one of the northern ranges for an endemic *Clinopodium chandleri* (USDA, 2005). Should a fire occur in my study area, it would be important to know what invasive species are present and could pose a risk to native habitats.

Figure 1: Maps showing my study area in relation to Southern California

Methods:

Collecting:

Over the past three years I have made 27 trips to collect plants.

- For each specimen I took field notes on the habit (shrub, annual, vine, aquatic), flower descriptions, height, hairiness, smell, latitude and longitude, elevation, and associated plant taxa.

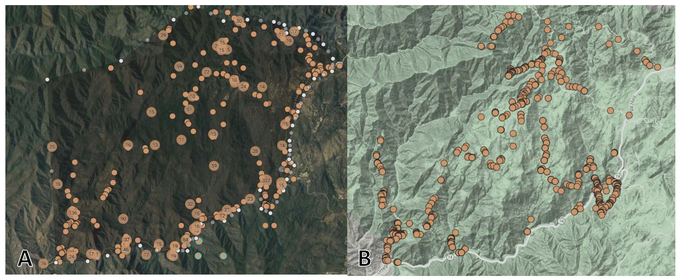
- Specimens were then identified to lowest taxon by using the Jepson e-flora key and other available keys.

Historic Specimens:

- To search for historic specimens I used the Long Beach State Herbarium (LOB) that has many collections from Chiquito Springs from 1950s-1980s
- I downloaded specimen data for Chiquito Springs from the Consortium of California Herbaria 2 (CCH2) using search terms for localities in the study area.

Preliminary Results:

Figure 2: (A) Map of the Chiquito Springs Basin study area showing locations of the 2,014 recent and historic collections in the flora. (B) 1,025 collections made over the course of three years of collecting 2018-2020.



Preliminary Results (cont.):

Figure 3: The figure on right shows a map of the study area with Cal-IPC invasive plants collected and identified so far. The orange border is the extent to which the fire infiltrated my Flora. The yellow pins are invasive specimens I collected. The red markers are historic specimens that have not been collected recently that are rated by Cal-IPC as highly invasive. (1)*Spartium junceum,* a Cal-IPC rated highly invasive plant has been recently collected around the southern portion of the study area. There have been 27 species found in the study area. During our collecting we found 13 invasive species: *Torilis arvensis, Vinca major, Spartium junceum, Trifolium hirtum, Ageratina adenophora, Hirschfeldia incana, Raphanus sativus, Ricinus communis, Rumex crispus, Centaurea melitensis, Oxalis pes-caprae, Nicotiana glauca, and Brassica nigra. Of these, 3 species (Brassica nigra, Nicotiana glauca, and* Ricinus communis) have not been previously collected according to our records in CCH2 (CCH2, 2019).

Discussion:

Historically, 27 invasive species have been collected in the study area, of those only 4 high risk species have been collected and only one (***Spartium junceum)*** has been collected consistently within the last four decades (CCH2, 2019). My Flora has collected 3 new invasive species to add to this list, predominantly along the southern edge of the study area, with *Brassica nigra, and Ricinus communis* falling into the moderate risk category and *Nicotiana glauca* having limited information. So far ***Spartium junceum*** has been the only high-risk invasive plant I have collected**,** however it has intruded further into riparian areas in the study area than has been previously recorded (Fig. 3). Historically, the other highly invasive taxa found in this area have been: *Bromus tectorum*, *Centaurea solstitialis*, and *Bromus madritensis subsp. rubens*. While identification of collected specimens is ongoing, the majority of the invasive plants identified have been in riparian areas along the borders of the study area. This seems comparable to the findings in the post Holy Fire report in which the main area where invasive plant intrusion appeared was along riparian and canyon habitats (Bell, 2019). Currently, I have not identified any highly invasive plants in the interior of the study area. This does not mean that there is no threat from invasive plants to the interior, rather an explanation for this absence could be collection bias for herbarium specimens against non-native taxa and the difficult access to areas located away from trails along the interior (Rich, 1992). However, the current and historic data suggests that riparian areas in my study area face threats from invasive plant intrusion and thus should be a focus for ongoing monitoring and possible removal where appropriate to ensure fewer individuals can spread into the area should a fire occur. It may also be advisable to look for signs of new intrusions of invasive plants farther up the canyons along Hot Springs Canyon Road and along the Ortega Highway.

References:

Bell, J. England, J. Fraga, N. (2019). *Holy Fire BAER Invasive Plant Surveys: Phase 1 of the Cleveland National Forest Native Plant Conservation, Restoration and Research Projects with Rancho Santa Ana Botanic Garden*. Jepson eflora. The University and Jepson Herbaria University of California, Berkeley. (2018). from Regents of the University of California

United States Department of Agriculture, (2005). "Land Management Plan Part 2 Cleveland National Forest Strategy." *United States Department of Agriculture Forest Service*.

Lathrop E., & Thorne, R. (1978). Flora of the Santa Rosa Plateau of the Santa Ana Mountains, California. *Aliso: A Journal of Systematic and EvolutionaryBotany*, *6*(4), p.17–40.doi

California Native Plant Society Staff, (2018). *California Native Plant Society.* **http://ucjeps.berkeley.edu/consortium/**

California Invasive Plant Council Staff. (2020). "Plants A-Z." *California Invasive Plant Council.*

Consortium of California Herbaria, CCH2 Portal. (2019). http//:www.cch2.org/portal/index.php.

Calflora: Information on California plants for education, research and conservation.[web application]. 2014. Berkeley, California: The Calflora Database.
Available: https://www.calflora.org/ (Accessed: Oct 13, 2020).

Population.us. (2016) Population of Lake Elsinore, CA. https://population.us/ca/lake-elsinore/

Rich, T. C. G., & Woodruff, E. R. (1992). RECORDING BIAS IN BOTANICAL SURVEYS. *Watsonia, 19*(2), 73-95.

Acknowledgements:

- I would like to thank Dr. Amanda Fisher, my thesis advisor at CSU Long Beach
- Lab members Daniel Donovan, Greg Cruz, Laymon Ball, Bryana Olmeda, Amy Nguyen, Sara Cuadra, Mariangel Fernandez, Marina Rice, and Keana Tang for assistance in the field.
- My Thesis Committee Naomi Fraga, and Christine Whitcraft
- Lauren Quon Cleveland National Forest Botanist and Jenny Moore, former Cleveland National Forest Botanist Mention access ot the study area and help with permit.
- Kirsten Winter, Cleveland National Forest Biologist