Identifying native plants that promote riparian insect community recovery after giant reed (*Arundo donax*) removal:

Ant community composition after *Arundo donax* (Giant reed) removal along the Santa Clara River

Charlie Braman &
Adam Lambert
Objectives

• Establish a baseline record of the ant assemblages in active and post-treatment Arundo removal restoration areas

• Identify linkages between native plant species and invertebrate assemblages to better inform future restoration efforts
Why ants?

- Naturally abundant and diverse
- Can sample without harming the community
- Important organisms for many systems
- Trends often mirror overall insect community
Surveying along the Santa Clara River

- 9 transects in Santa Paula
  - 47 Sample locations
- 6 transects in Fillmore
  - 30 Sample locations

Timeline:
- Summer Survey Jun-Aug 2019
  - 16 transects
- Winter Survey Jan-Mar 2020
  - 14 transects

Microhabitats
- Arundo Dominated
- Replanting
- Riparian Forest
- Riparian Scrub
- River Channel
- Watercress Beds
Vegetation Monitoring

• Transects installed before/during initial Arundo treatment

• Vegetation coverage evaluated by the line intercept method (Canfield 1941)

• Data collected as centimeters of coverage for each species of plant identified (Coverage can overlap)

• Assessed for 5 meters, then a 5 meter gap, until 50 meters reached

• Wanted to start incorporating insect data as well
Sample methods

- Sampling locations nested within vegetation transects every 10 meters
- Nordlander pitfall (Higgins and Lindgren 2012)
  - Non-baited propylene glycol, collected @ 72 hrs
- Pecan shortbread bait
  - Collected at 2 hours
- 1 meter² of Leaf litter
  - Placed in Winkler Extractors for 4 days
- Trap orientation reversed in winter
Environmental data

- Known factors influencing ant communities

- Canopy coverage evaluated with handheld spherical densiometer
  - Collected over each trap, combined for sample location average

- Soil moisture and texture
  - Soil dried, suspended in water column, assessed with hydrometer at 40 sec and 2 hours

- Soil cover assessed with square meter grid
  - Collected at each trap
NMDS ordination with ordiellipses by microhabitat ($k = 2$, permutations = 50, dissimilarity = Bray-Curtis)

PERMANOVA indicates significantly different communities by microhabitat
Tapinoma sessile

Arundo
Species Incidence fit to 100% by Microhabitat

Cardiocondyla mauritanica
Cremaogaster hespera
Dorymyrmex insanus
Formica francoeuri
Forelius pruinosus
Hypoponera opaciceps
Liometopum occidentale
Linepithema humile
Monomorium ergatogyna
Pheidole hyatti
Pogonomyrmex californicus
Solenopsis molesta
Solenopsis validiuscula
Solenopsis xyloni
Stenamma punctatoventre
Temnothorax andrei
Temnothorax nitens
Temnothorax spp.

Antweb, Jen Fogarty
Antweb, April Noble
Antweb, April Noble

Arundo, Replanting, Riparian Forest

Antweb, April Noble
Antweb, April Noble
Antweb, April Noble
Antweb, April Noble
• Used regression technique linking plants to ant communities. First research we know to combine species assemblages and restoration plants in this manner.

• Accounts for known environmental drivers (soil, H2O, canopy cover, and ground cover).

• Depending on microhabitat historically and/or desired in each area, several native plants may facilitate and/or accelerate arthropod community recovery:
  - *Baccharis pilularis* R. Scrub
  - *Salix lasiolepis*, *Populus trichocarpa*, and *Rubus ursinus* in Riparian Forest
  - *Cucurbita foetidissima* (Coyote gourd) in active revegetation sites
  - *Heliotropium curassavicum* in active river channel
  - Arundo, *Salsola tragus*, and *Bromus madritensis* had a similar effect in infested sites.

• Likely related to the ability of these plants to establish lateral cover while providing structural and nutritional resources.
Questions?
charliebraman@ucsb.edu

Other great talks about our river system and restoration efforts

• Adam Lambert: Leveraging Partnerships to Advance Giant Reed Removal and Restoration
• Sean Carey: Avian Responses to Riparian Restoration
• Evan Hobson: Pollinator Response to Removal of Giant Reed and Restoration Strategies in a Riparian System