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

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LET THERE BE LIGHT

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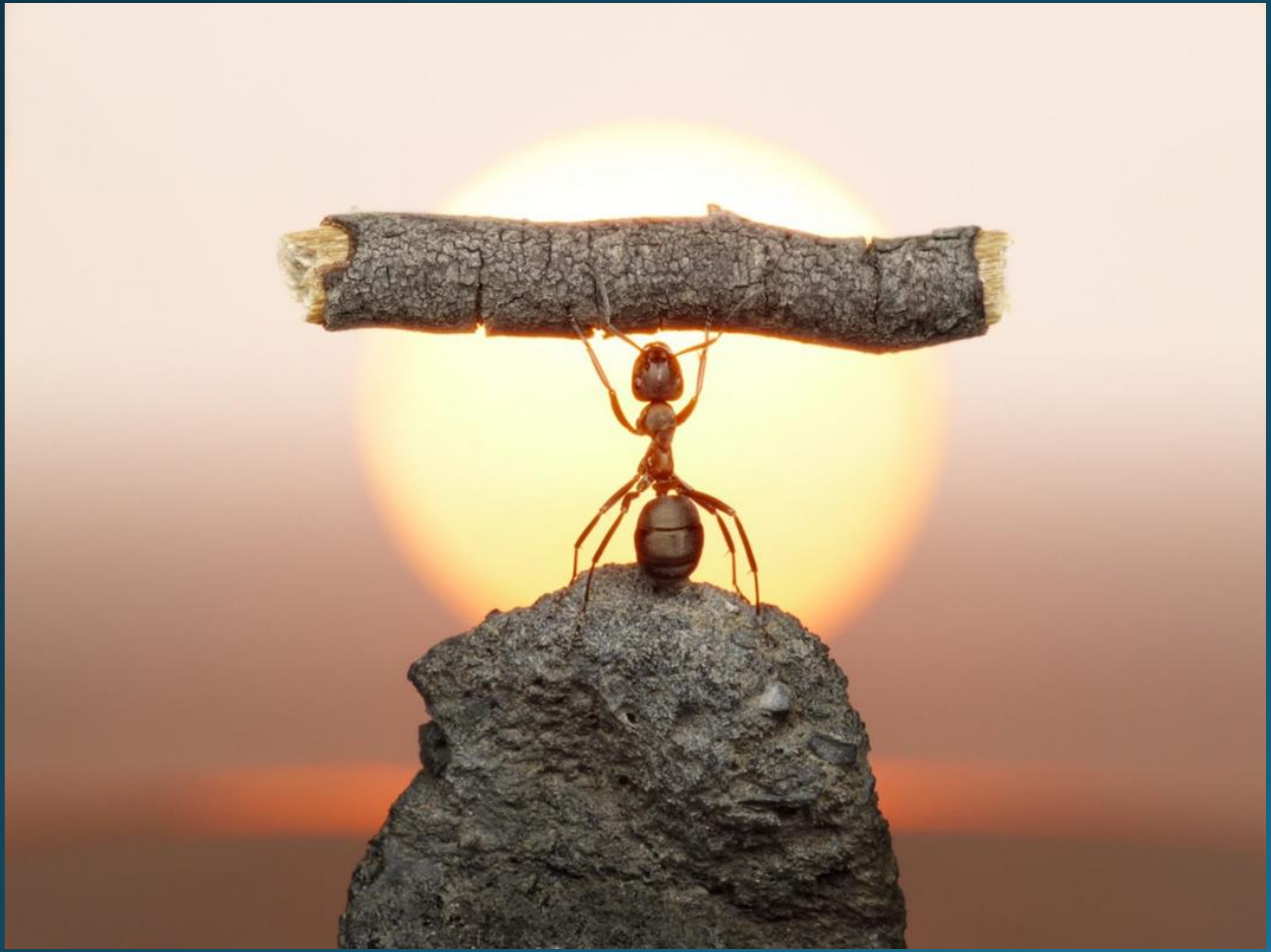
Objectives

- 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?



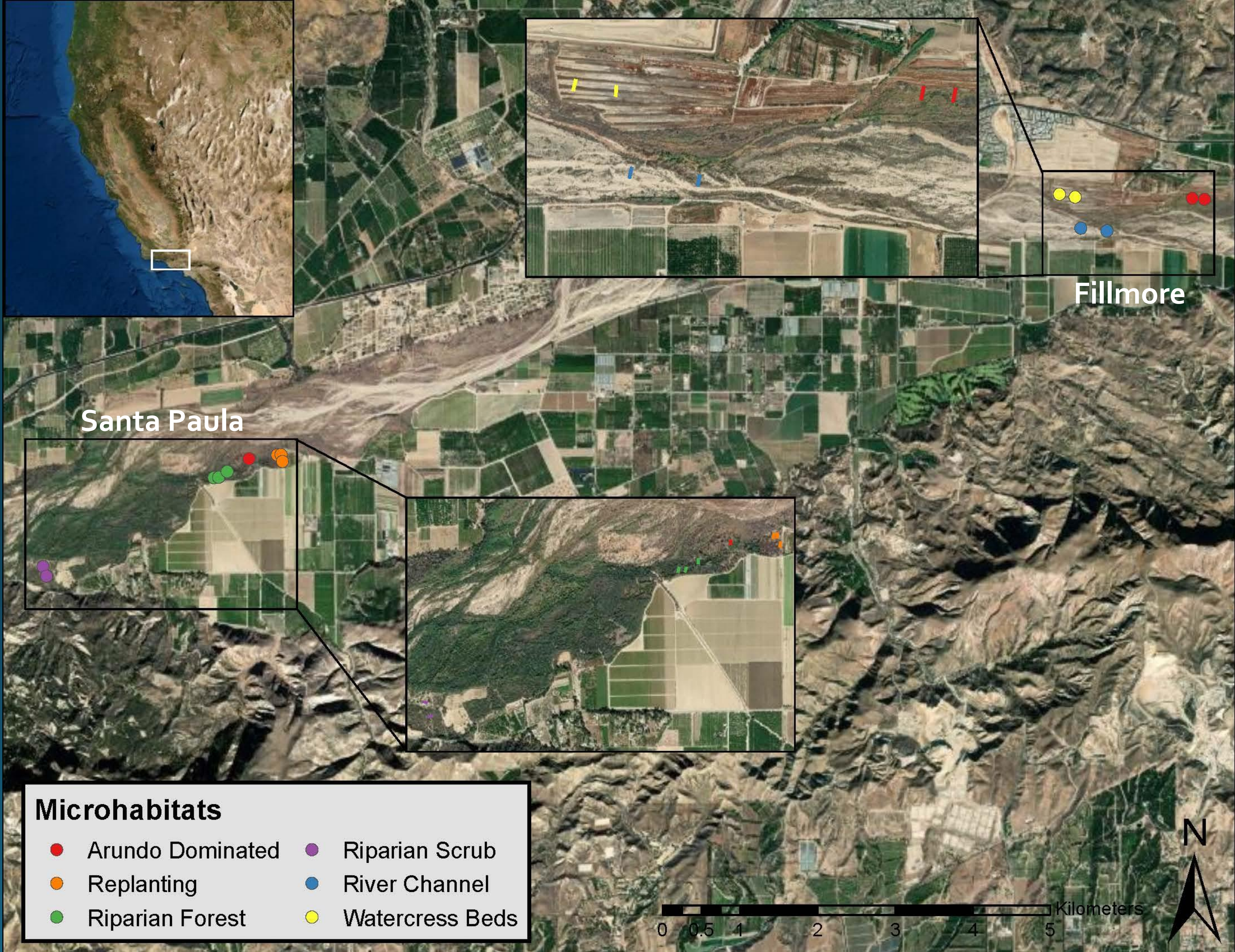
- Naturally abundant and diverse
- Can sample without harming the community
- Important organisms for many systems
- Trends often mirror overall insect community

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



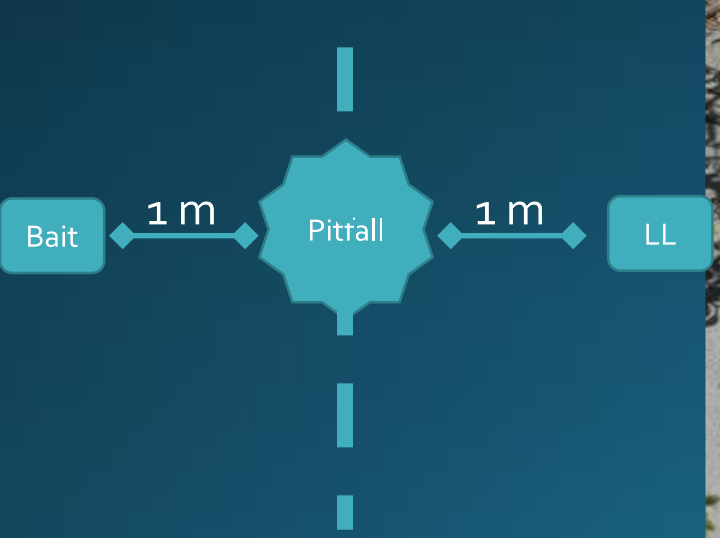

Arundo
Riparian Scrub
River Channel
Replanting
Riparian Forest
Watercress

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 meter^2 of Leaf litter
  - Placed in Winkler Extractors for 4 days
- Trap orientation reversed in winter



Nordlander pitfall traps


Winkler leaf litter extractors


Pecan shortbread bait

Environmental data

- Known factors influencing ant communities

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

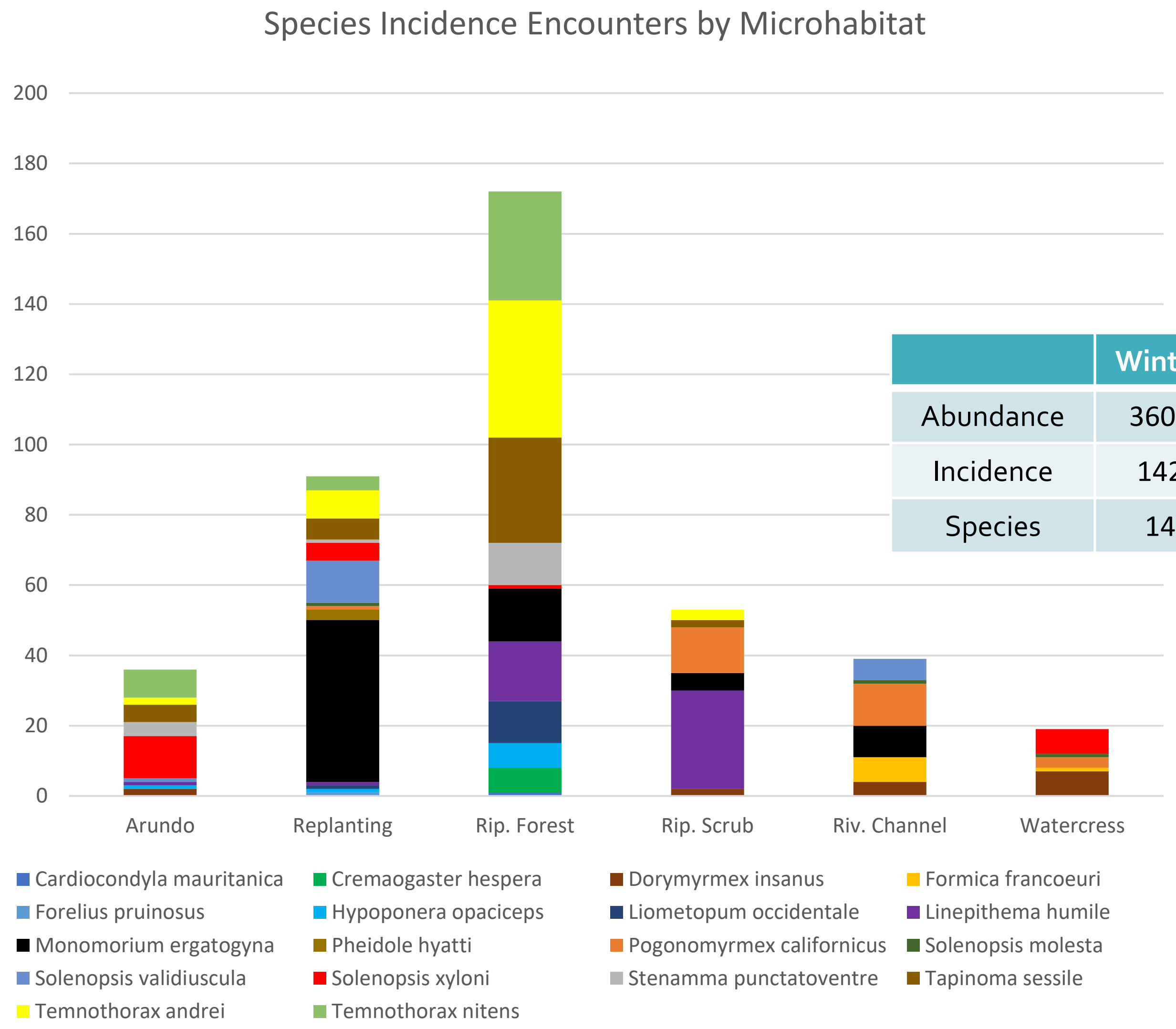
- Soil moisture and texture
  - Soil dried, suspended in water column, assessed with hydrometer at 40 sec and 2 hours

- Soil cover assessed with square meter grid
  - Collected at each trap

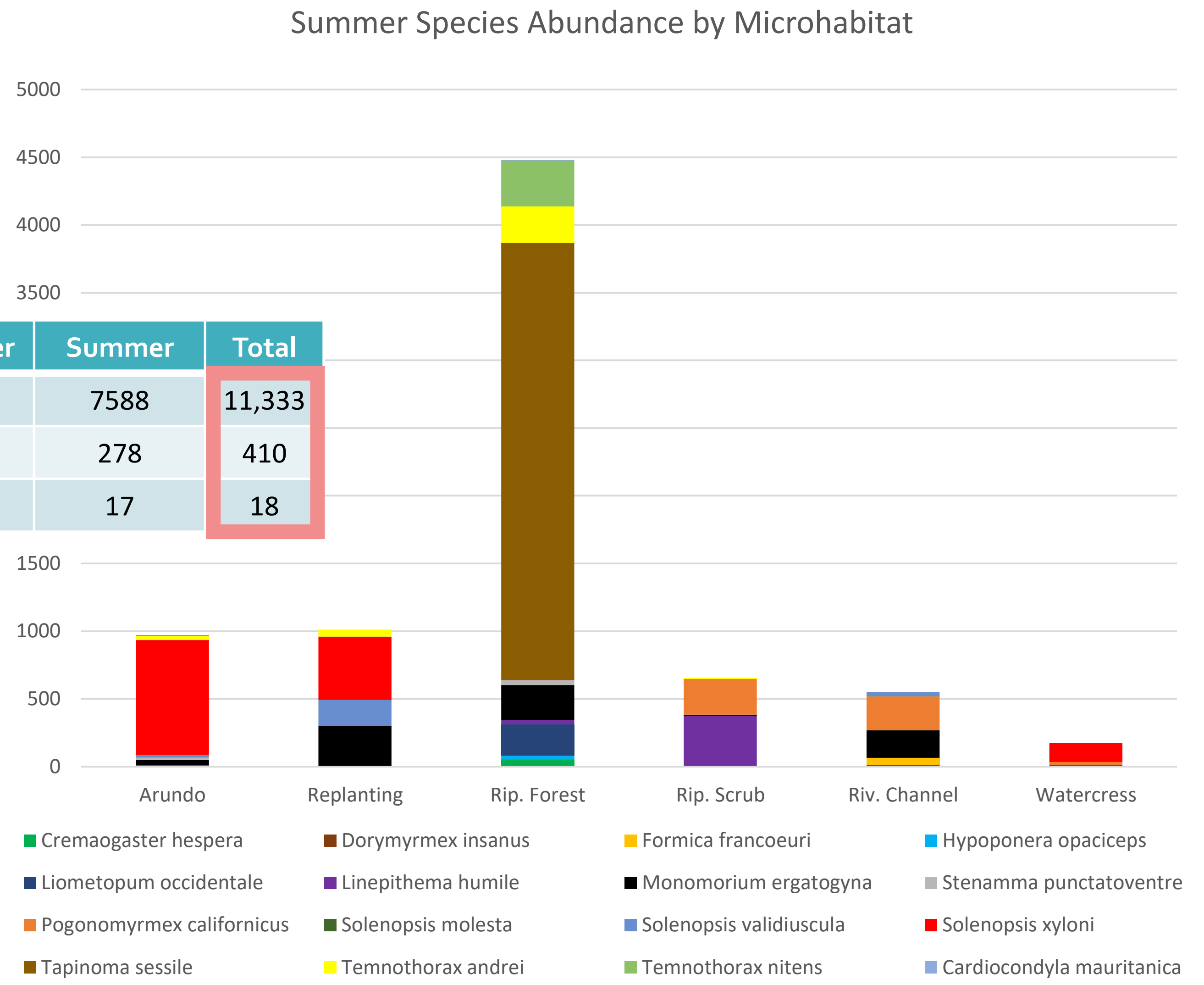
Canopy Coverage


Soil Texture Analysis


Coverage Assessment

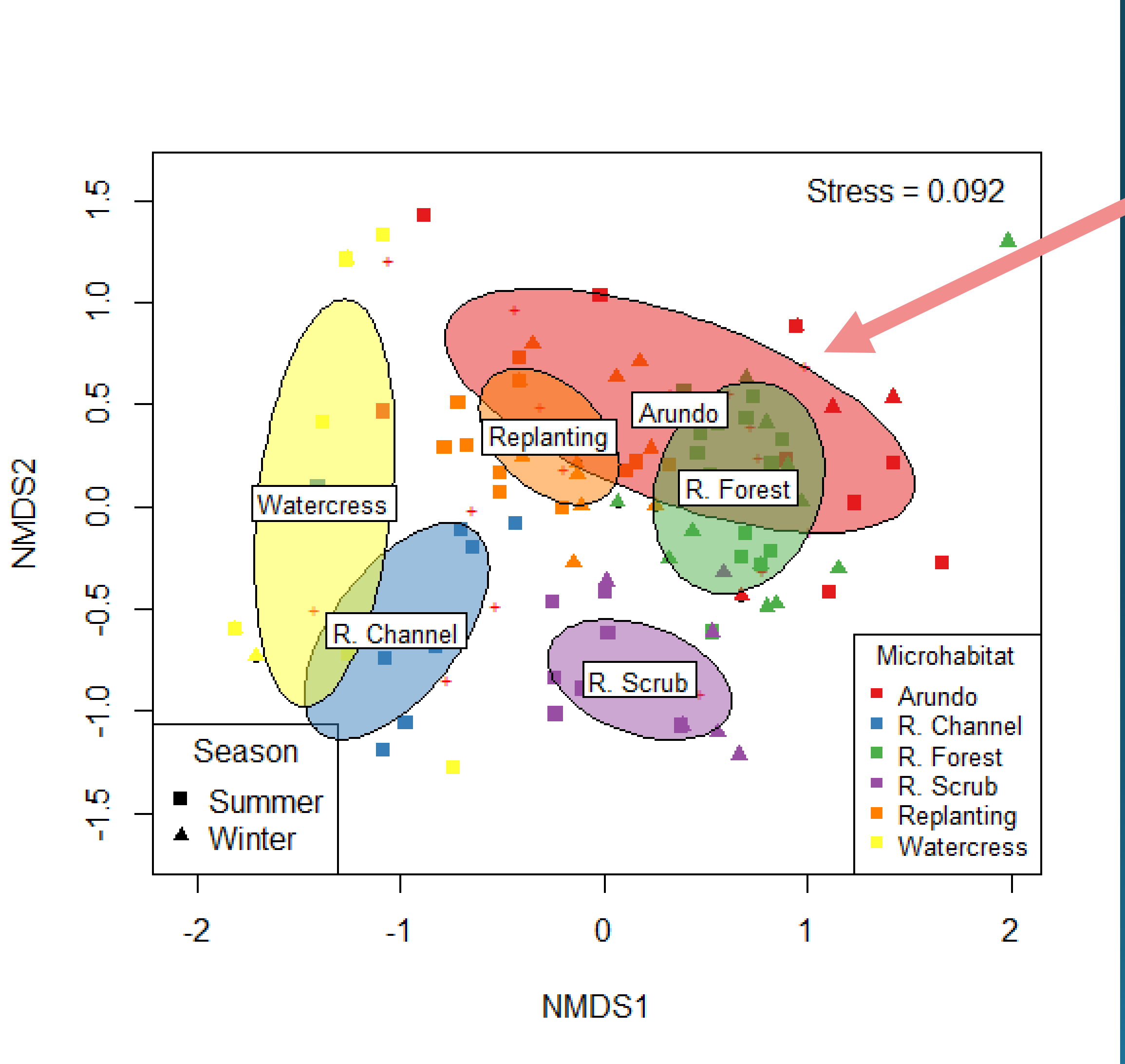


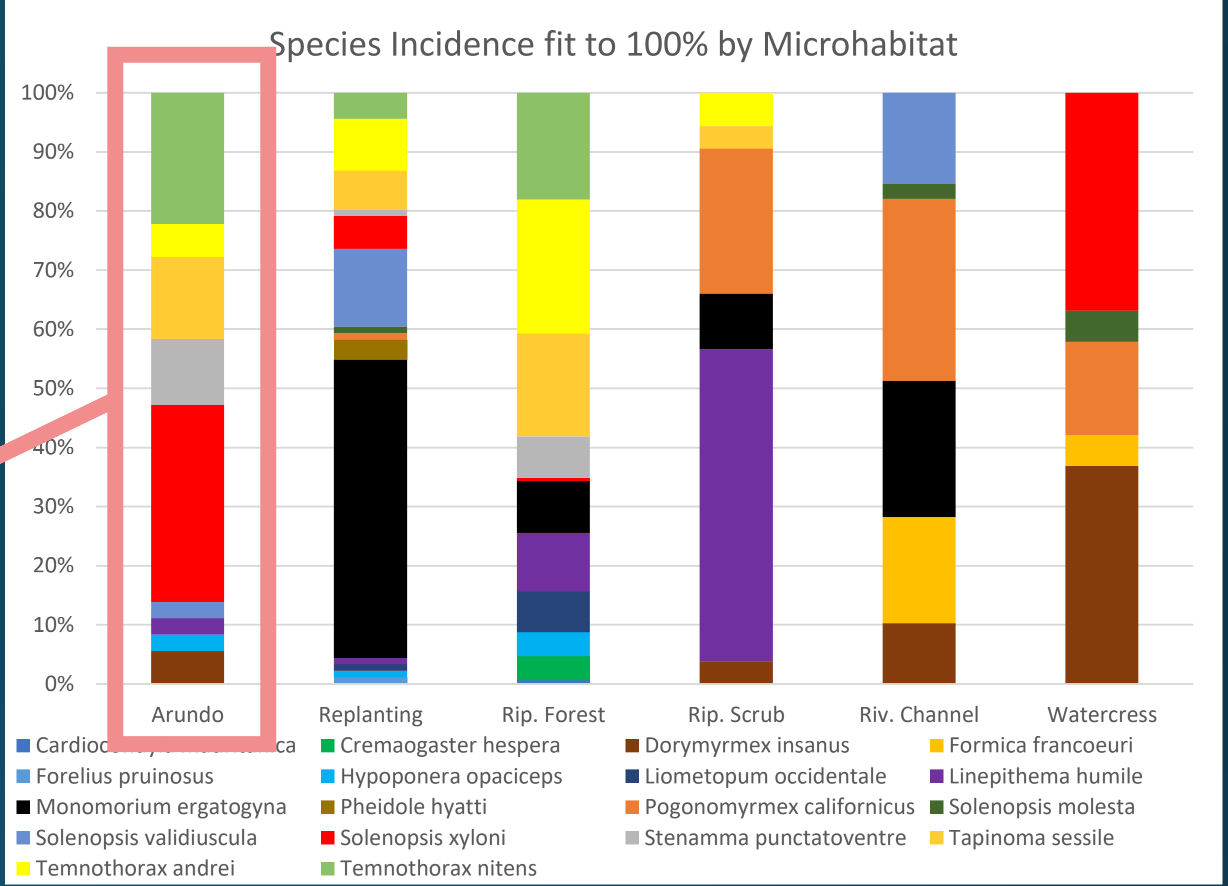
	Winter	Summer	Total
Abundance	3603	7588	11,333
Incidence	142	278	410
Species	14	17	18

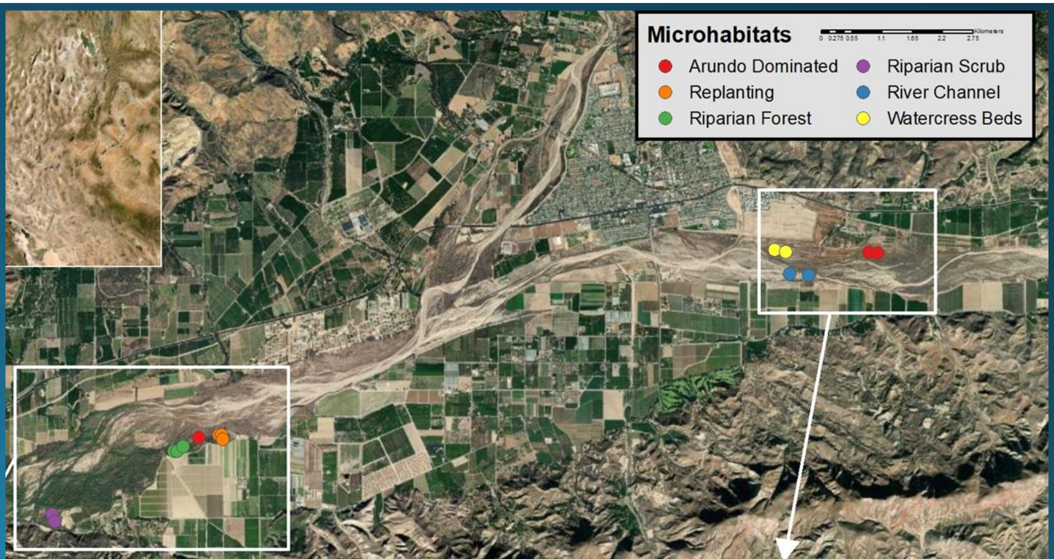


NMDS ordination with ordiellipses by microhabitat(k = 2, permutations = 50, dissimilarity = Bray-Curtis)

PERMANOVA indicates significantly different communities by microhabitat

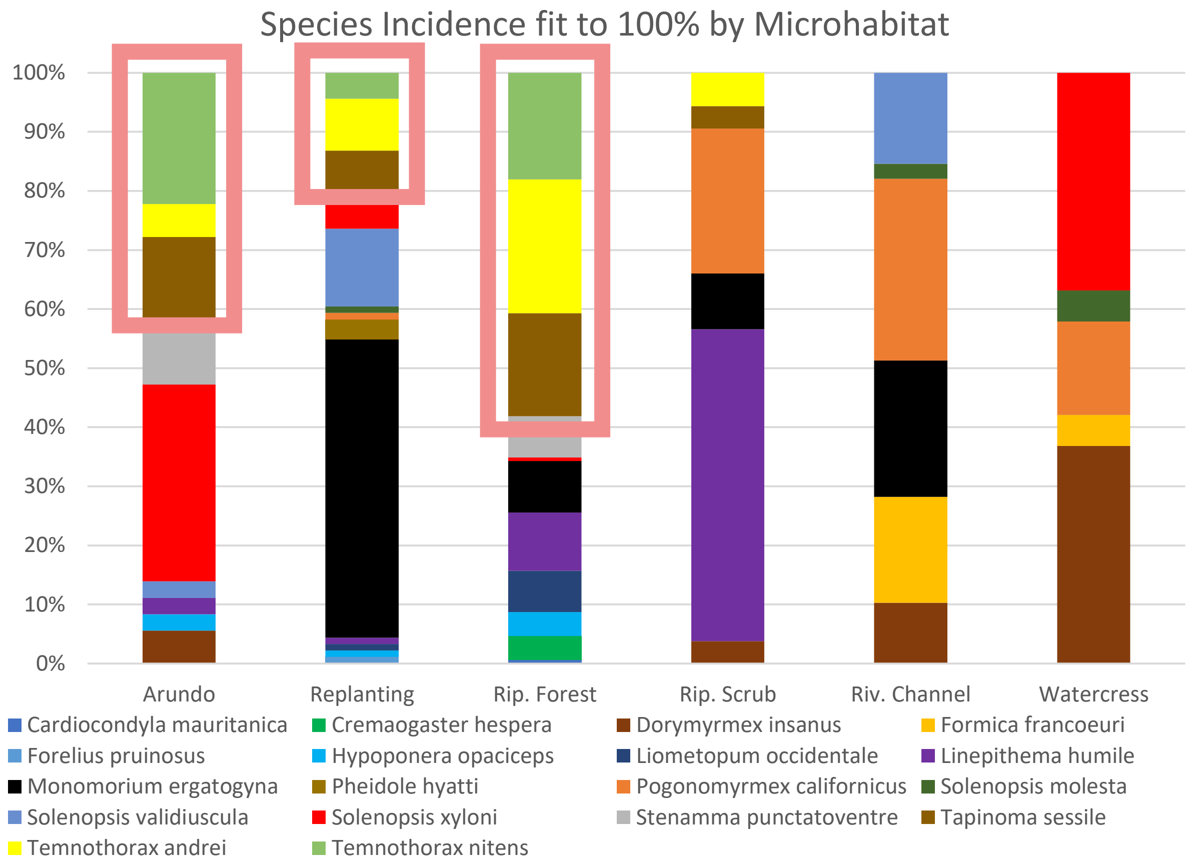







Temnothorax spp.
Antweb, Jen Fogarty
Antweb, April Noble


Tapinoma sessile
Antweb,

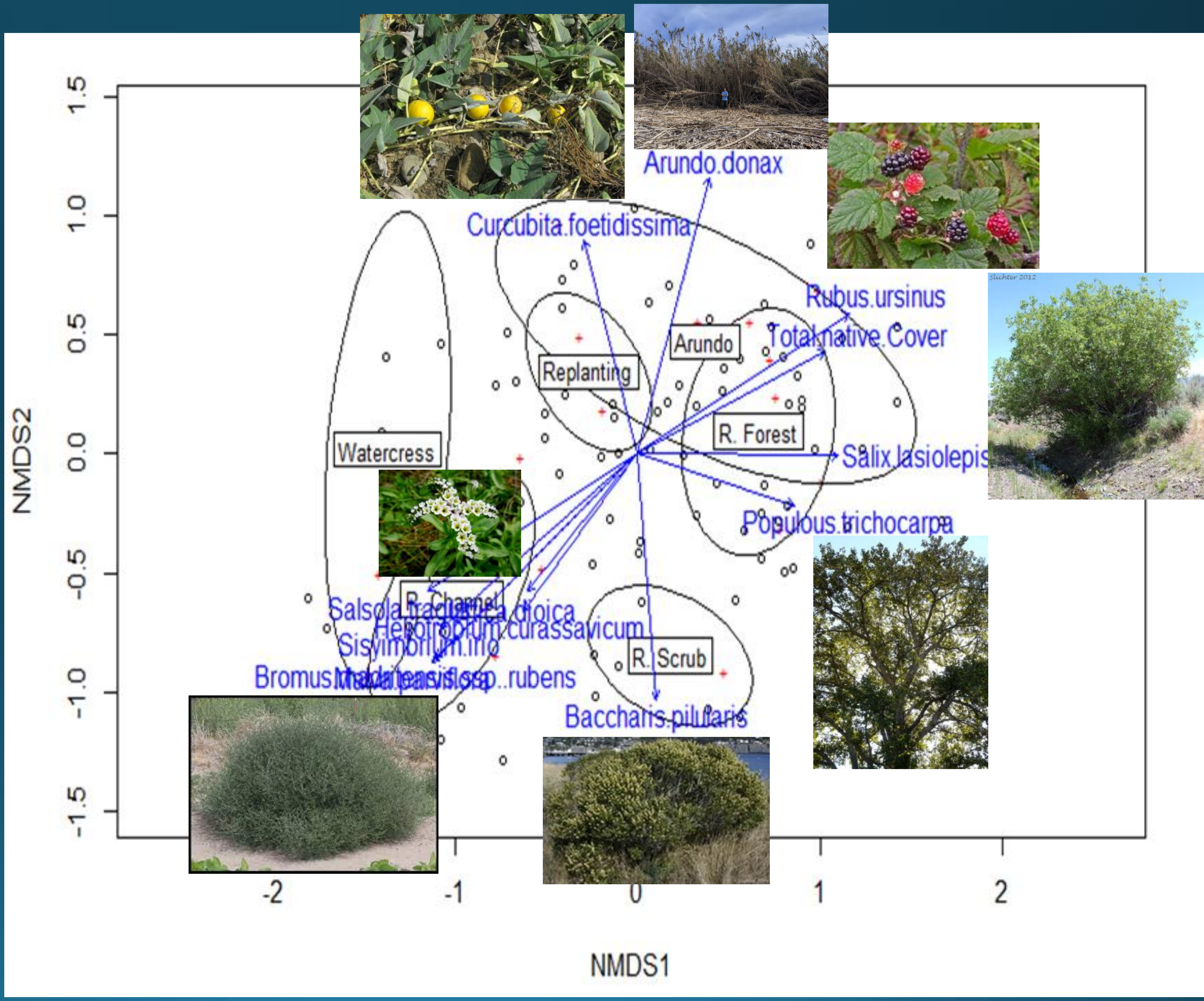

Species Incidence fit to 100% by Microhabitat
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Arundo
Replanting
Rip. Forest
Rip. Scrub
Riv. Channel
Watercress
Cardiocondyla mauritanica
Cremaogaster hespera
Dorymyrmex insanus
Formica francoeuri
Forelius pruinosus
Hypoponera opaciceps
Liometopum occidentale
Linepithema humile
Monomorium ergatogyna
Pheidole hyatti
Pogonomyrmex californicus
Solenopsis molesta
Solenopsis validiuscula
Solenopsis xyloni
Stenamma punctatoventre
Tapinoma sessile
Temnothorax andrei
Temnothorax nitens


Arundo


Replanting


Riparian Forest

- 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, H_2O, 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 revegitation 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?

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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