

Fremont Lower vs. Upper Foliage: Are there important differences in chemistry or arthropods?



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RECLAMATION
Managing Water in the West

WHY STUDY RIPARIAN SYSTEMS?

Riparian habitats threatened (2% left, Goslee 2005)

Hotspots of biodiversity

WHY STUDY FREMONT COTTONWOODS?

Foundation species (Whitham et al. 2006)

Important to many species (YBCC)

WHY STUDY ARTHROPODS?

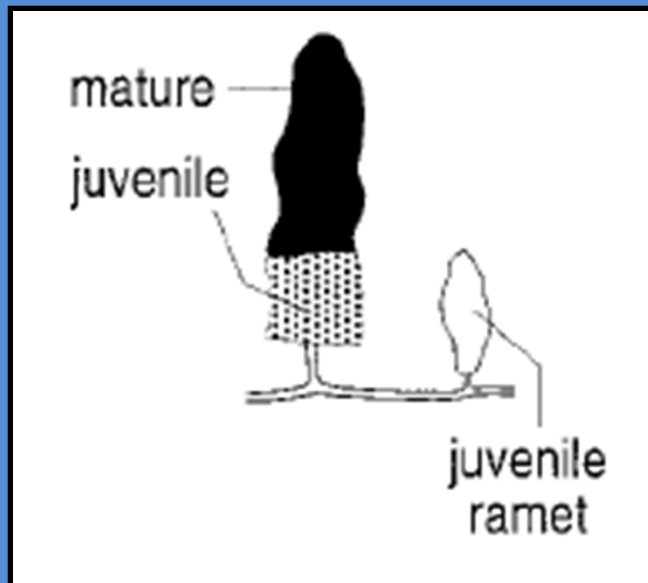
Insects as biodiversity indicators (Duelli 1997)

Prey species



Why are we talking about this?

Chemistry and arthropod communities vary within a tree
in a sister species (*Populus angustifolia*)



Known differences in chemistry and arthropods in
adult and juvenile foliage (ontogenetic effects) in
NARROWLEAF cottonwood, higher elev. species

Rehill et al. 2006, Keith et al. 2010, Holeski et al. 2010

Waltz and Whitham 1997



What about Fremont cottonwoods?

In Fremonts, little to no measured chemistry variation

- Rehill et al. 2006
- Holeski 2010



Juvenile (lower) and Mature (upper) Foliage Chemistry

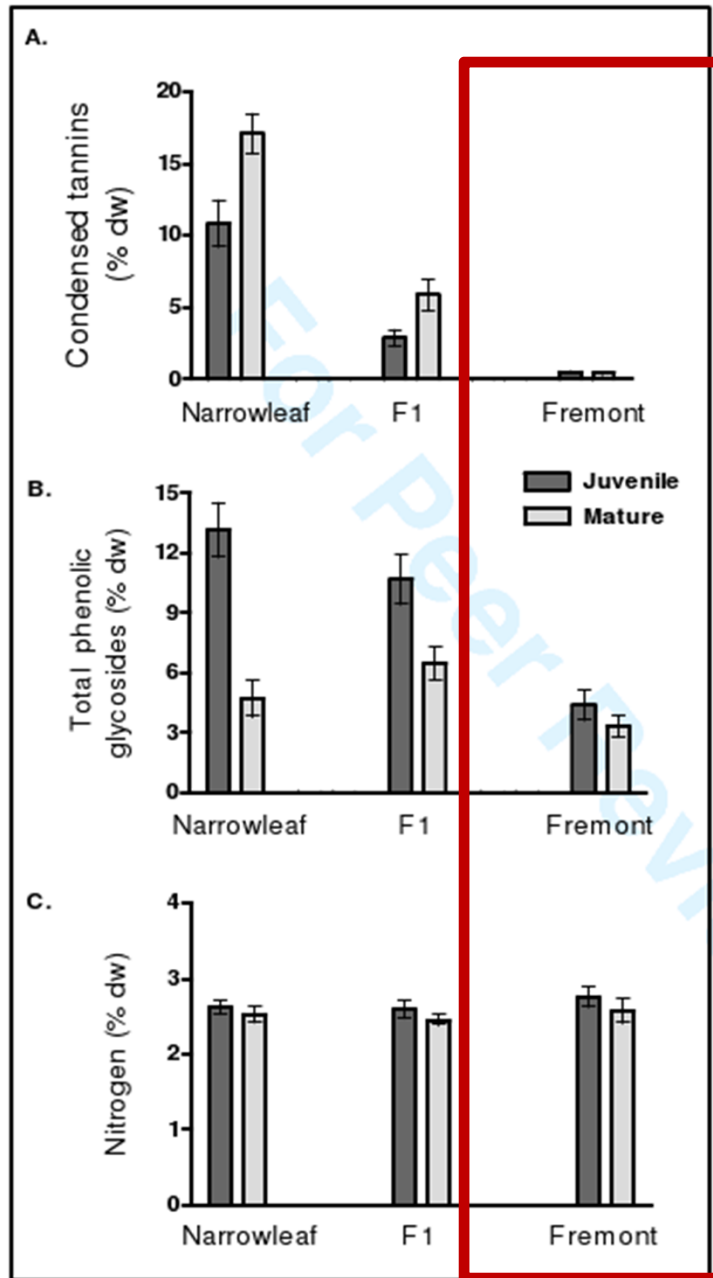
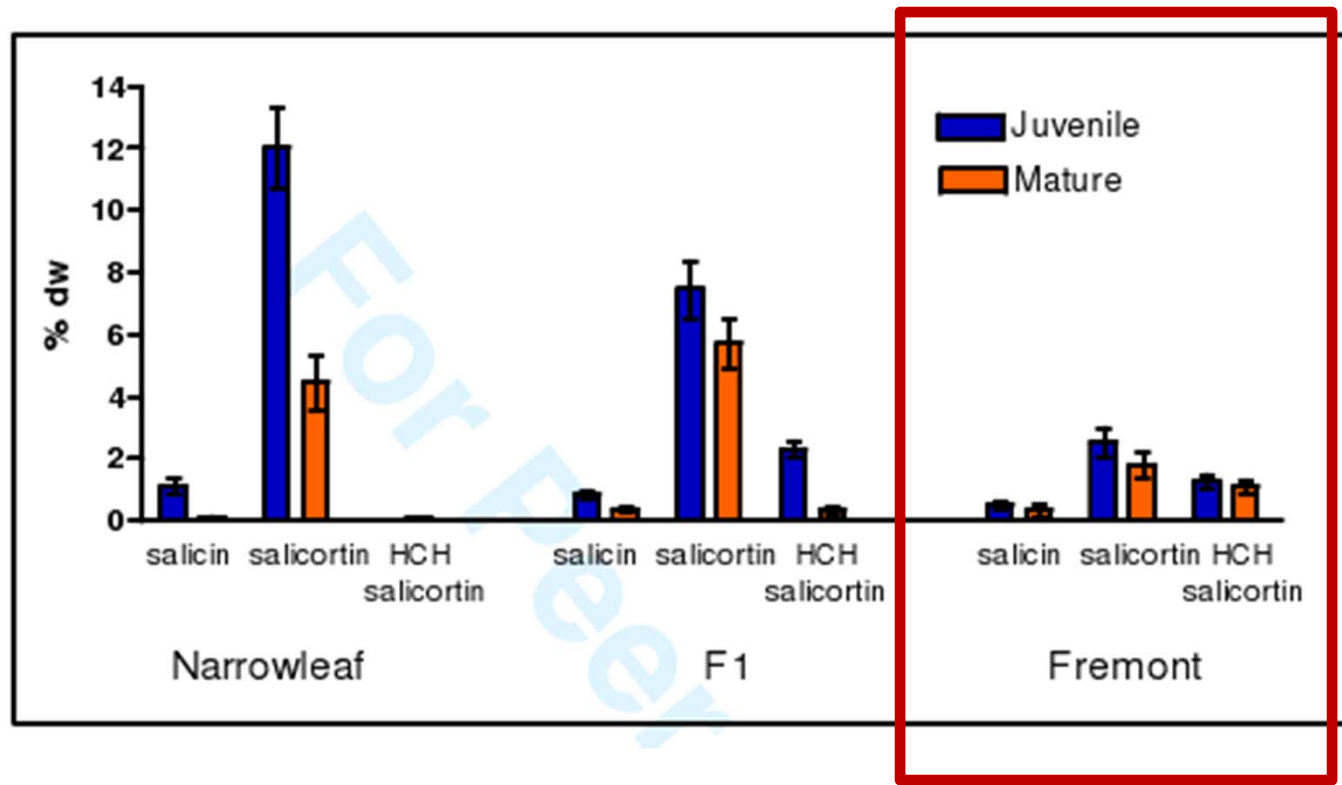


Figure 2. Constitutive levels of condensed tannins, total phenolic glycosides, and nitrogen (% dry weight) in cottonwood foliage.

Error bars represent +/- 1 standard error (SE) from the mean.

More Chemistry...

Figure 1S. Early season, constitutive phenolic glycosides (the sum of each of these component phenolic glycosides is our estimate of “total phenolic glycosides”. Error bars represent +/- 1 SE from the mean.



So what?

My community patterns are driven by leaf modifiers

Leaf modifiers don't respond to variation

- Wimp 2007, unpublished data
- Durben et al. 2009, unpublished data



All previous studies:
on ladders, lower foliage



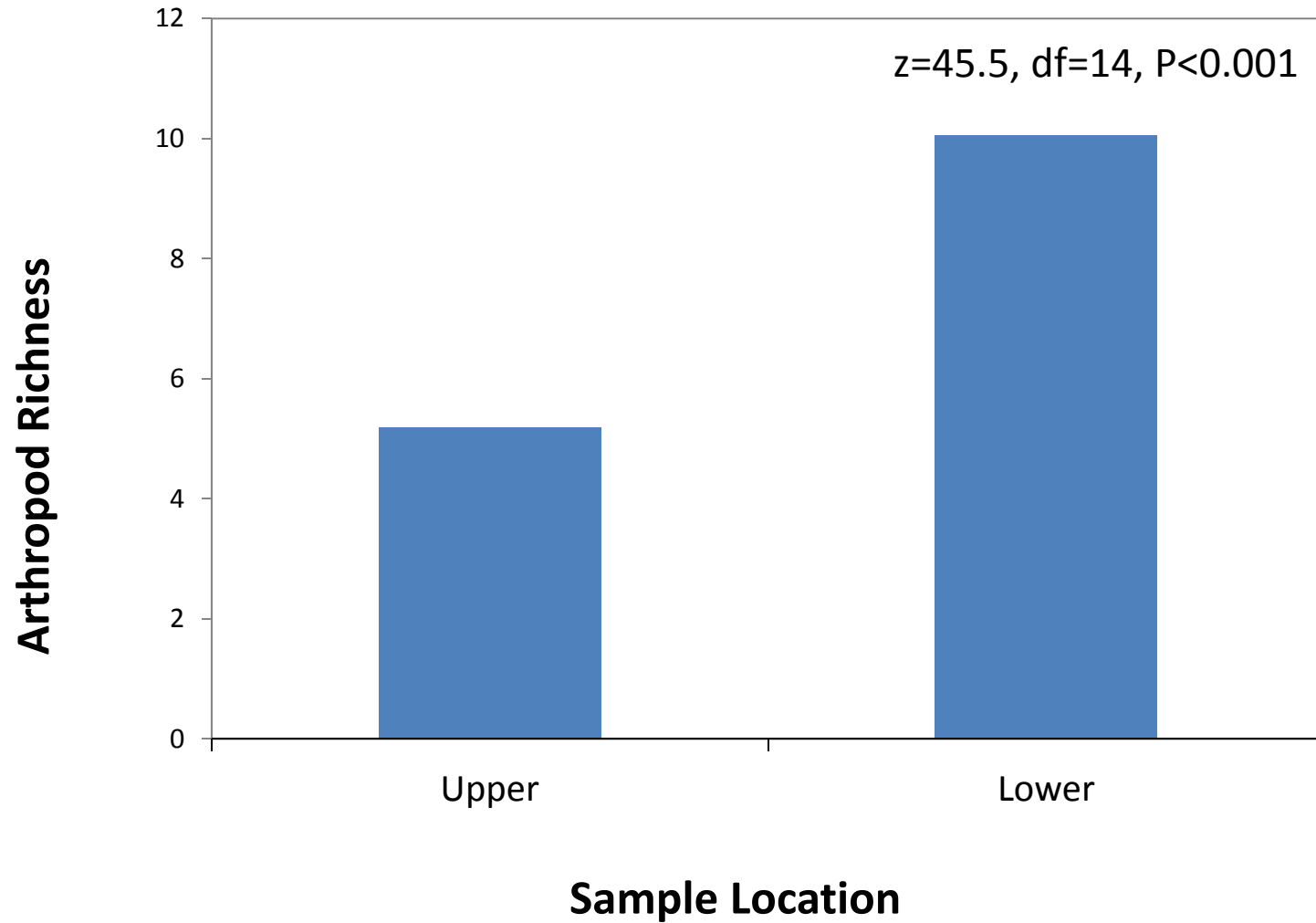
Lower vs. Upper Foliage Arthropod Community Surveys

- Aug 2010
- Timed visual obs.
- N=15
- 8 most abundant animals are leaf modifiers

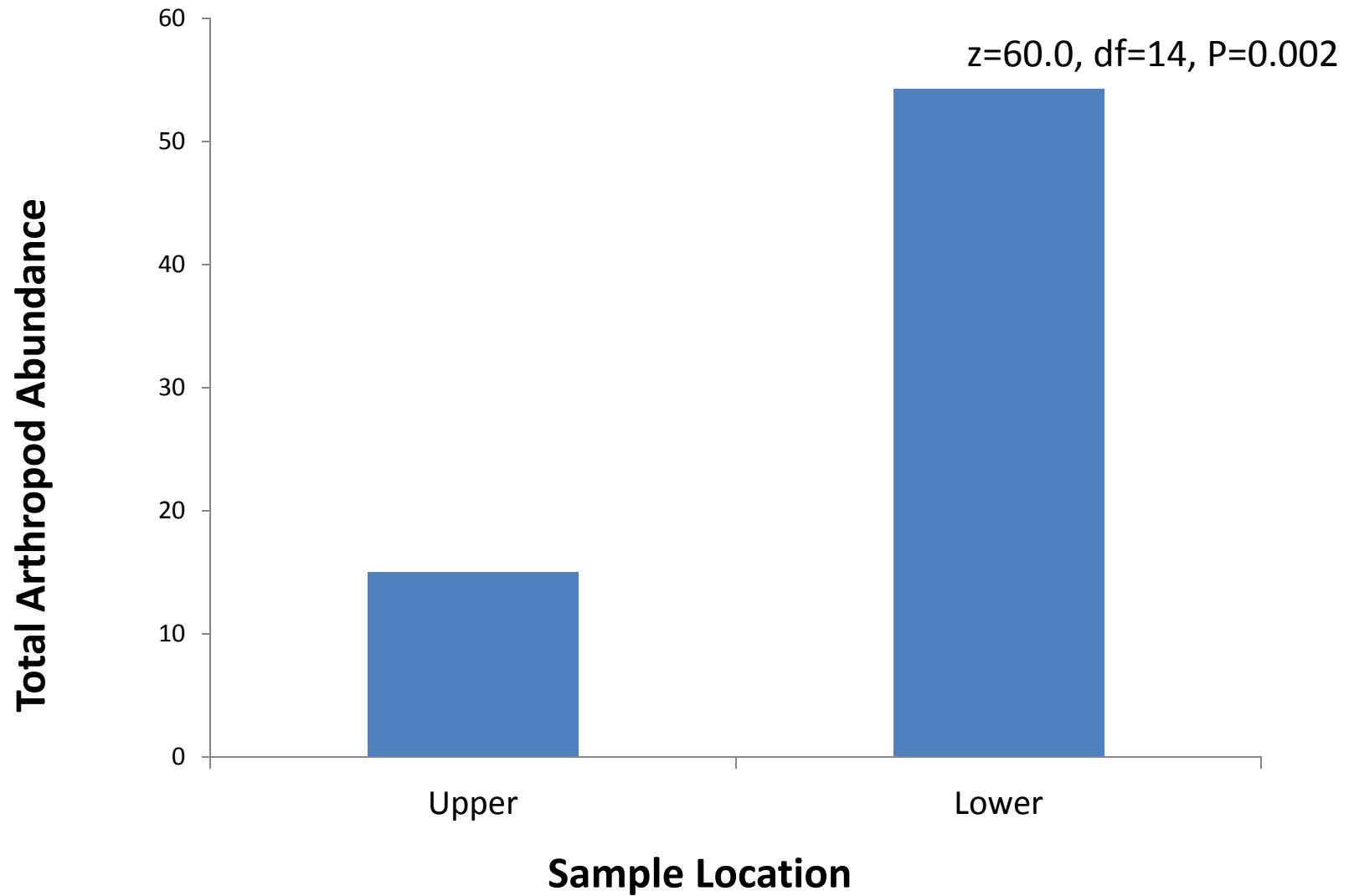




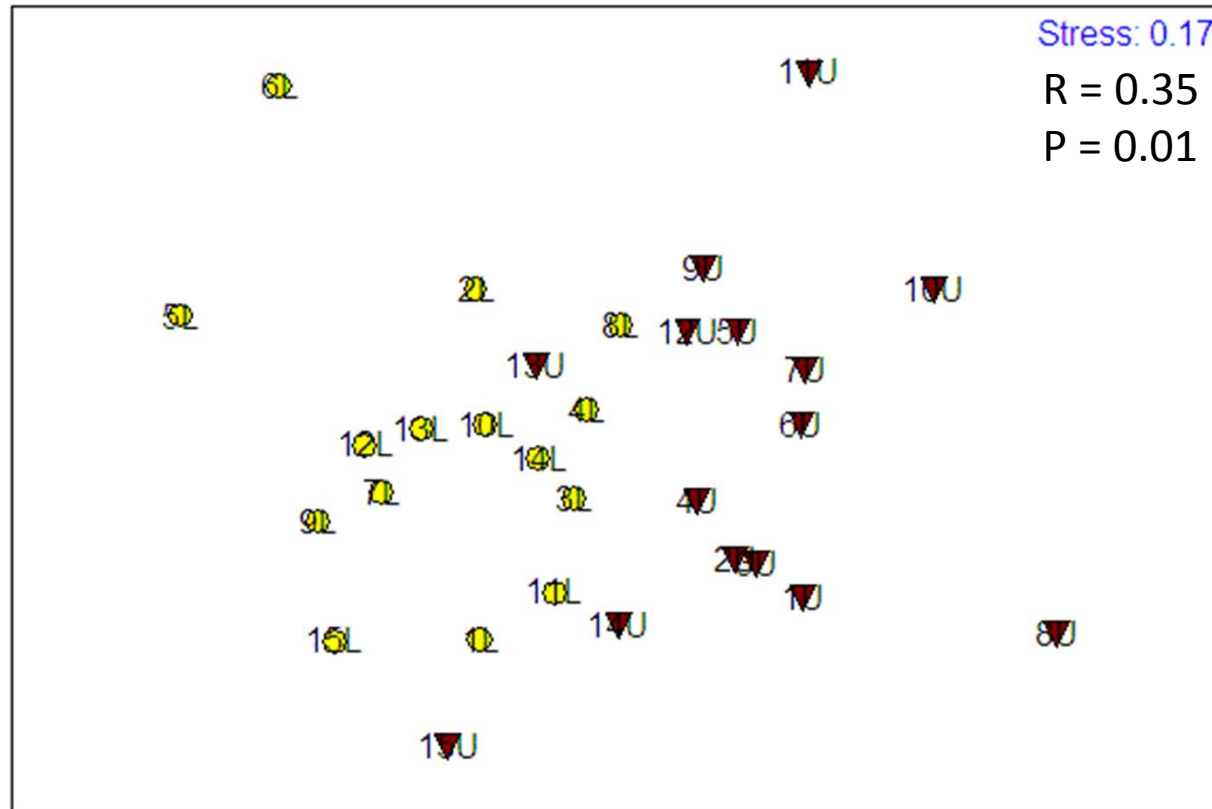
Arthropod Richness



Total Abundance

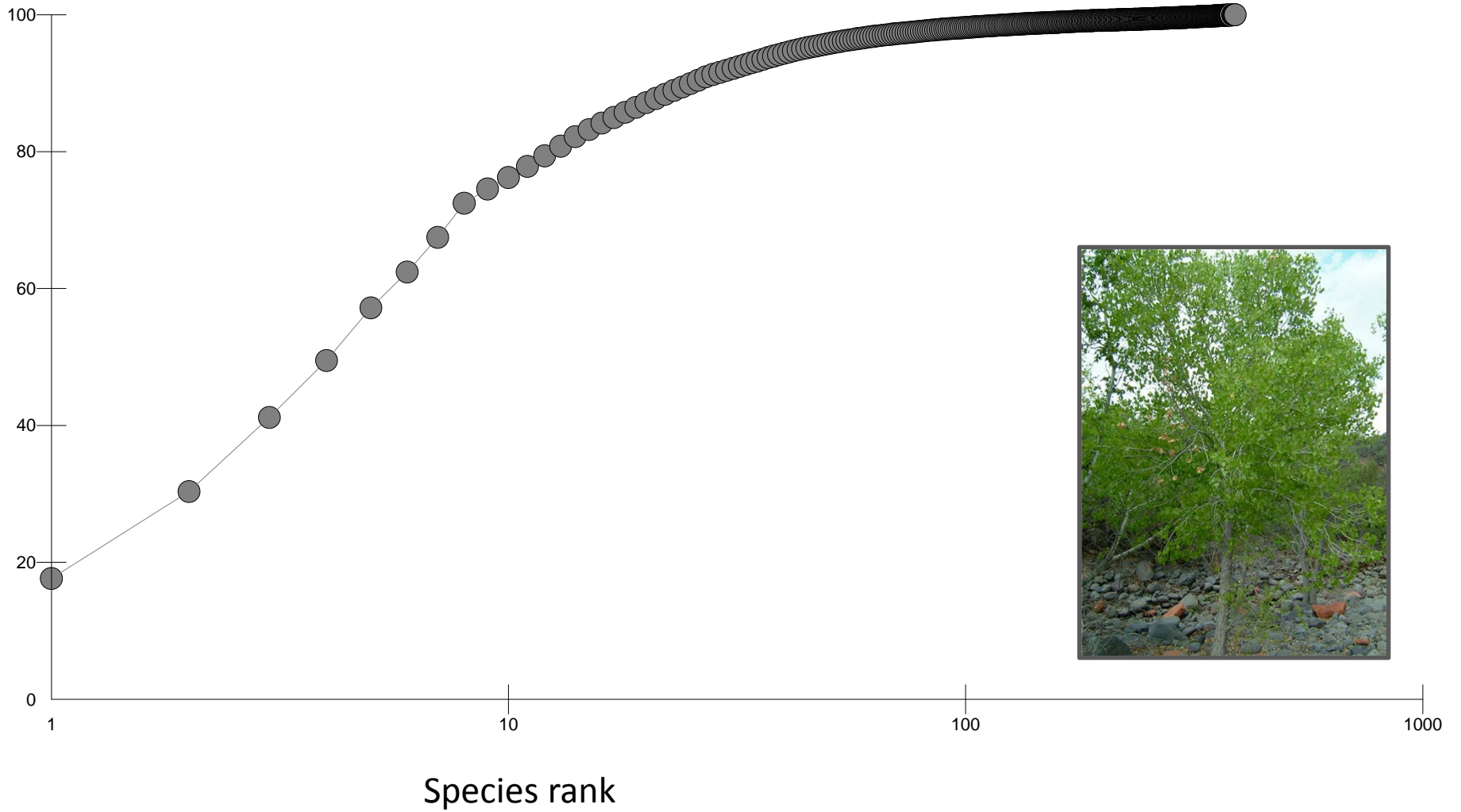


Upper and Lower Canopy Arthropods- NMDS

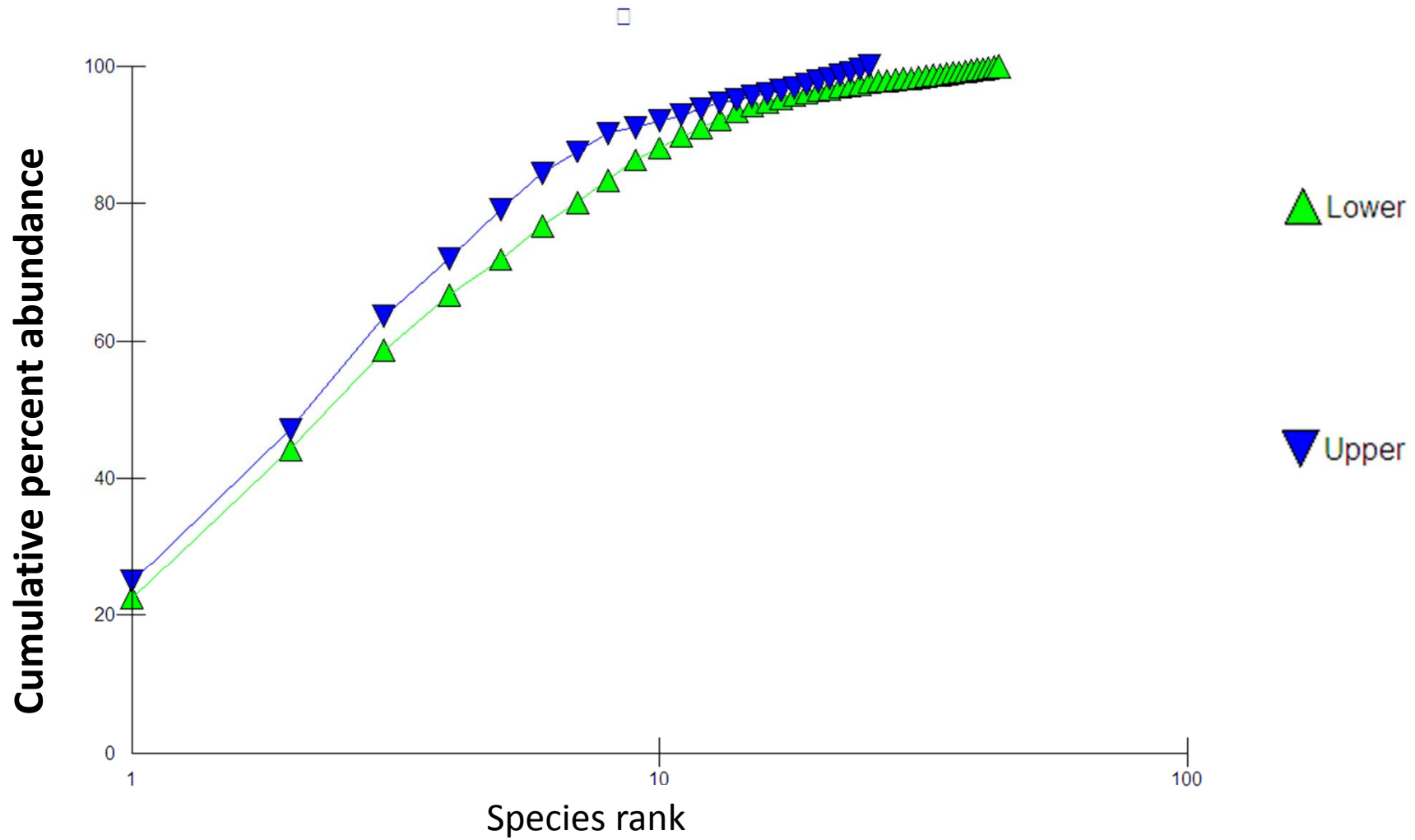


CNWR Arthropod Community percent abundance

g g



Dominance Plot



Other Arthropod Survey Results



PVER

November 2010

- N=20
- Modifiers only
- Same; Lower branches ↑

Verde River

June 2008

- N=20
- Modifiers only
- No differences

Summary

- No chemistry differences, though leaves vary
- Differences in communities vary by study;
2 for lower **↑**, 1 for no difference
- If lower branches have more, we may over-estimate arthropods in studies



Management Consideration...

By planting homogenous stands of trees close together, we may speed process of thinning lower branches and decrease prey species availability



Acknowledgements

Karla Kennedy

Rachel Durben

Sharon Ferrier

Cibola National Wildlife Refuge

Bureau of Reclamation



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