

Forest Soil Arthropods in the High Canopy of California's Coastal Redwoods: Community Structure and Dynamics

Michael Camann, Karen Lamoncha,
Clint Jones, Laura Hagenauer, and
Leah Larsen;

Humboldt State University

Old growth redwoods have complex crown structure.

- reiterated trunks, buttresses, complex branching and fusion, epiphyte mats



Epiphyte mats provide suspended arboreal habitat islands.



- size and height vary
- habitat for epiphytes and animals



Arboreal histosols have distinct horizons and rhizospheres.

- water storage
- interstitial habitat
- low pH organic detritus
- can persist for centuries



Sitka spruce and Douglas fir also harbor large histosol accumulations.



Sampling arthropods in arboreal epiphyte mats and histosols.

- access via arborist climbing methods to place:
 - pitfall traps
 - litter bags
 - soil cores
 - flight intercept traps



Arboreal soils support a rich arthropod fauna.

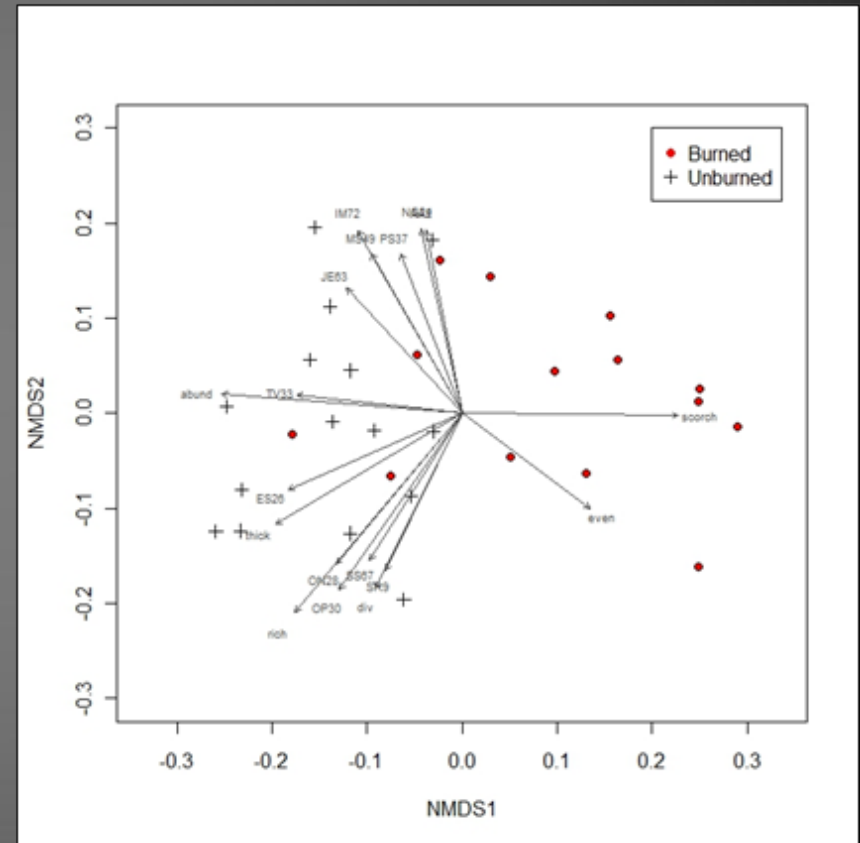


Photos provided by Stephen Sillett



Forest soil microarthropods are bioindicators of ecosystem trajectory.

- hyperdiverse assemblages
- trophic redundancy
- respond to a broad range of disturbance classes
 - community structure
 - ecosystem services



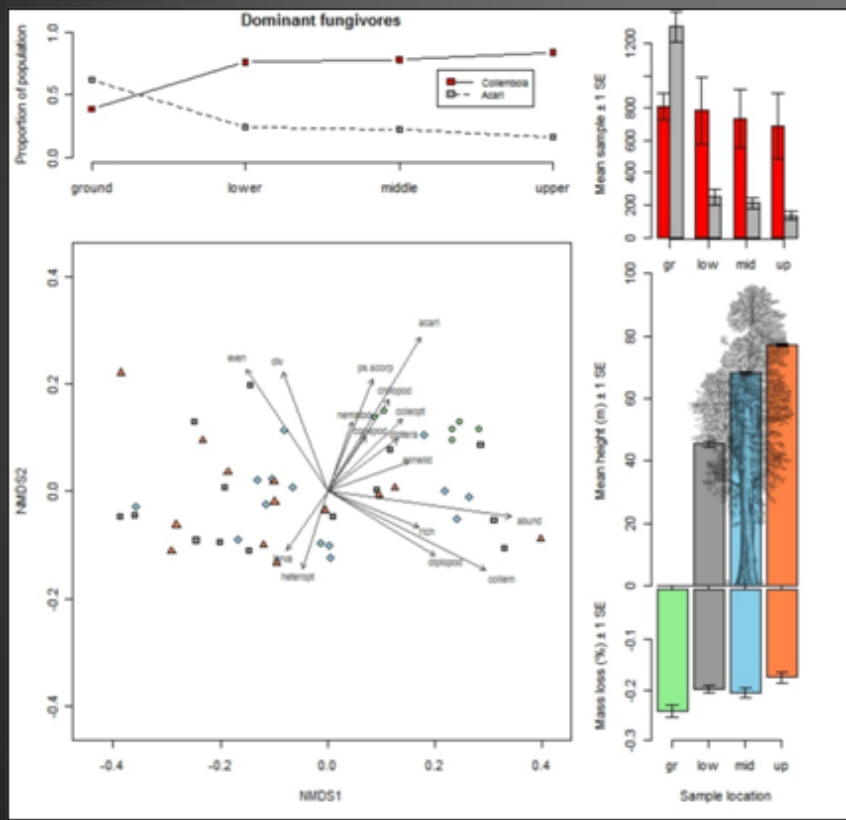
Acarine assemblage responses to low intensity fire management at Blacks Mtn Experimental Forest.

Redwood canopy assemblages are taxonomically rich.

Entognatha		
	Collembola (>55 spp)	
	Protura	
	Diplura	
Insecta		
	Coleoptera	
	Orthoptera	
	Diptera	
	Hemiptera	
		Heteroptera
		Auchenorrhyncha
		Sternorrhyncha
	Hymenoptera	
	Lepidoptera	
	Psocoptera	
	Thysanoptera	
Chilopoda		
Diplopoda		
Paupoda		
Symphyla		
Araneae		
Pseudoscorpiones		
Opiliones		

Acari		
	Oribatida (>83 spp)	42 families
	Mesostigmatida	
	Prostigmatida	
	Astigmatida	
Copepoda	Harpacticoida	
Isopoda		
Other invertebrates:		
	Gastropoda	
	Annelida	
	Nematoda	
	Platyhelminthes	
	Rotifera	

Assemblage structure changes with habitat height in redwood crowns.

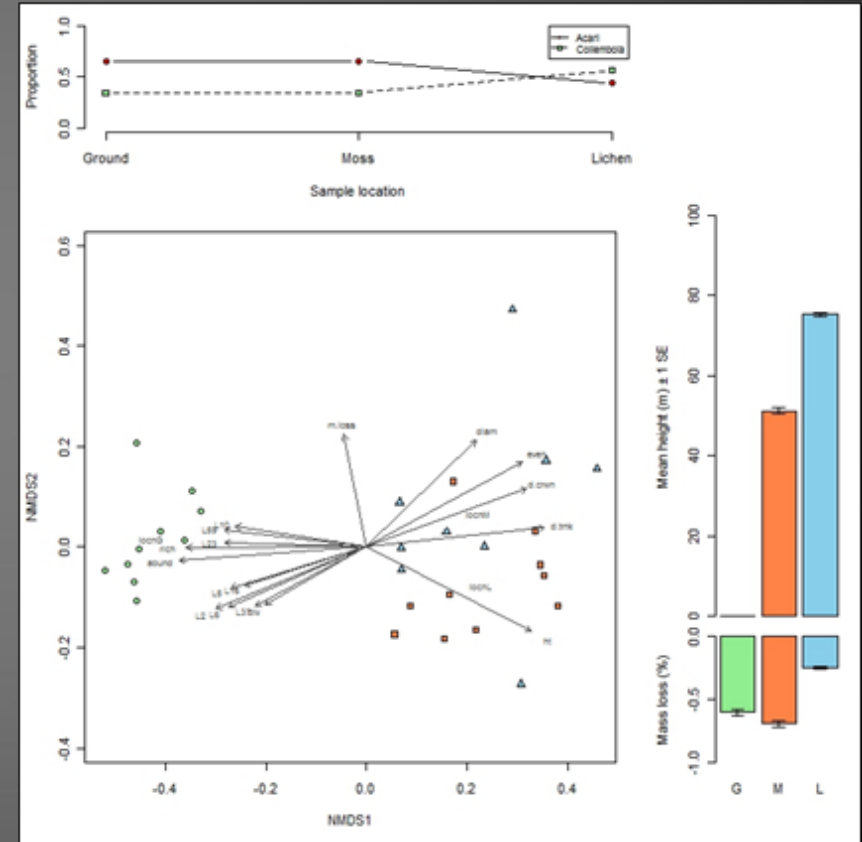


Tree drawing by Robert Van Pelt

- increasing:
 - assemblage evenness
 - proportional abundance of springtails
- decreasing:
 - assemblage abundance, taxon richness, and diversity
 - proportional abundance of mites
 - litter decomposition rate

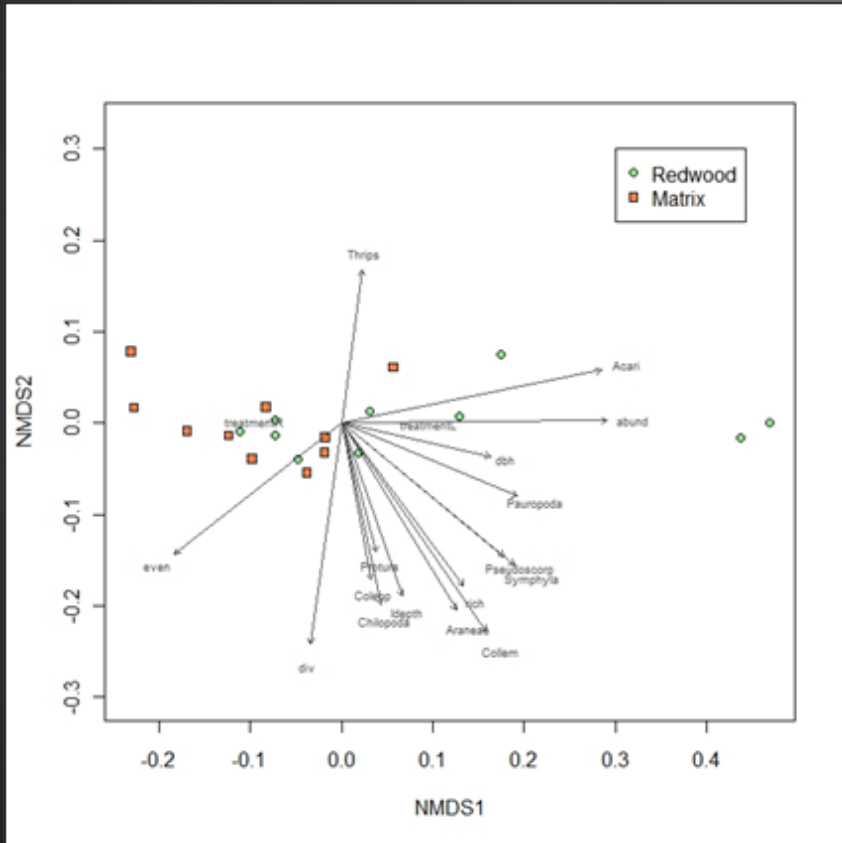
Microarthropod assemblages are sensitive to substrate in Sitka spruce.

- bryophyte dominance in sheltered crown zones
- lichens more exposed



Photos provided by Stephen Sillett

We also see distinct communities beneath relict old growth redwoods.



- old growth redwoods within a matrix of tan oak-Douglas fir regeneration
- distinct habitat islands



Conclusions

- Coastal redwood forest canopies have unique structural attributes that foster characteristic arthropod communities in persistent arboreal histosol habitat islands.
- The longevity of these mats permits them to develop long lasting assemblages.
- Arboreal microarthropod assemblages respond to a variety of disturbances and other influences.
- Relict redwoods within a second growth matrix preserve some elements of old growth arthropod associations.

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