



# Pollen Representation of Vegetation Pattern in Woodrat Middens

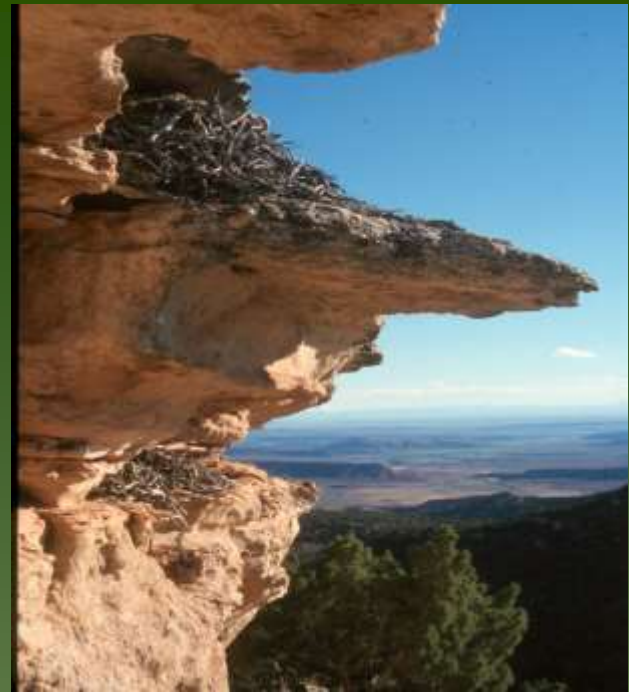
By Danielle Marie Reed  
With Dr. Stephen T. Jackson

# Introduction

- ◆ How well does pollen preserved in woodrat middens represent vegetation?
- ◆ Fossil Woodrat Middens
- ◆ Focus: Modern Woodrat Middens, *Neotoma*
- ◆ Dr. Mark Lyford and Dr. Stephen Jackson—vegetation data



DJM Fossil Midden

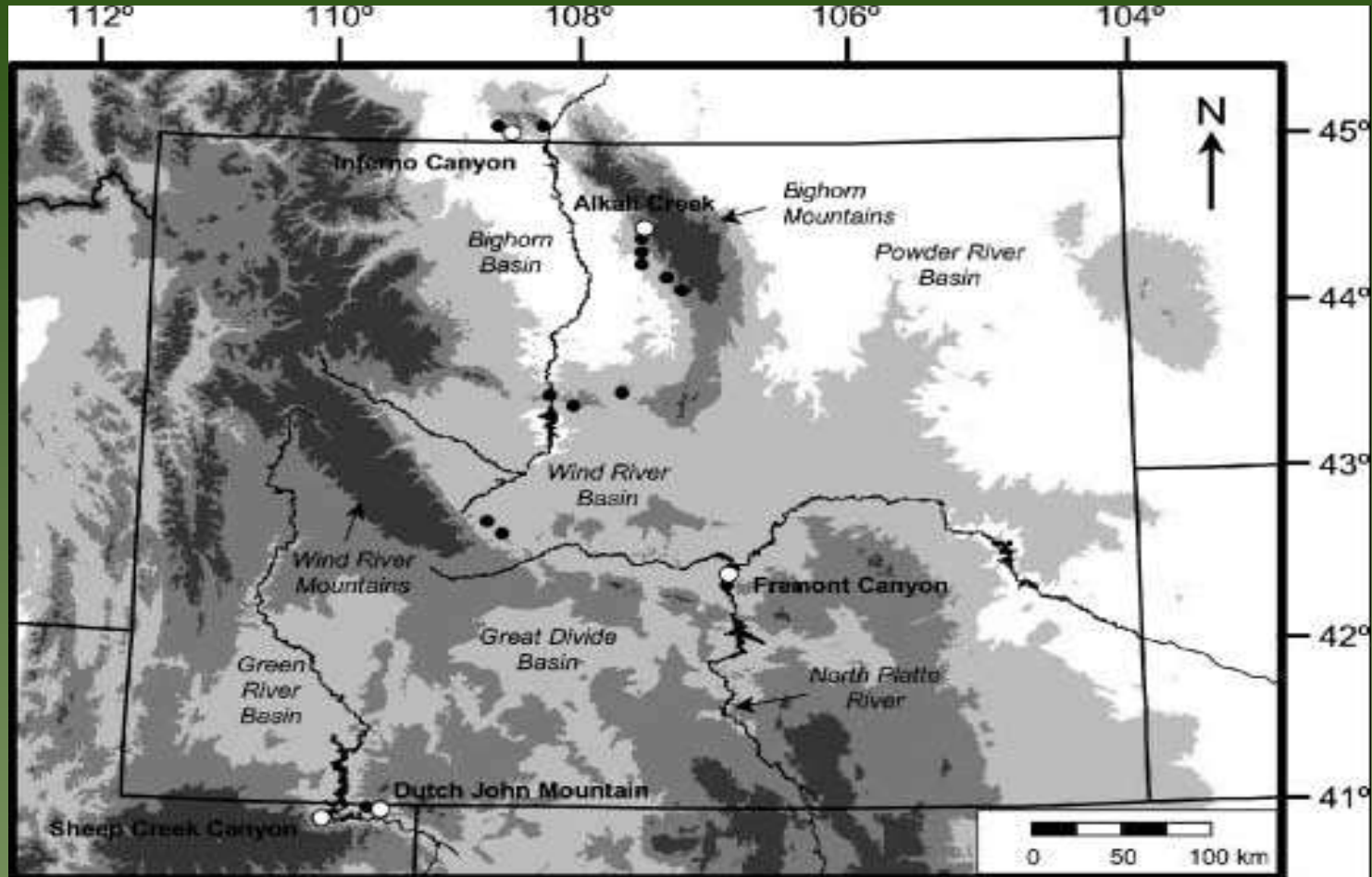


Alkali Creek Midden



West Carrizo Canyon Modern Midden

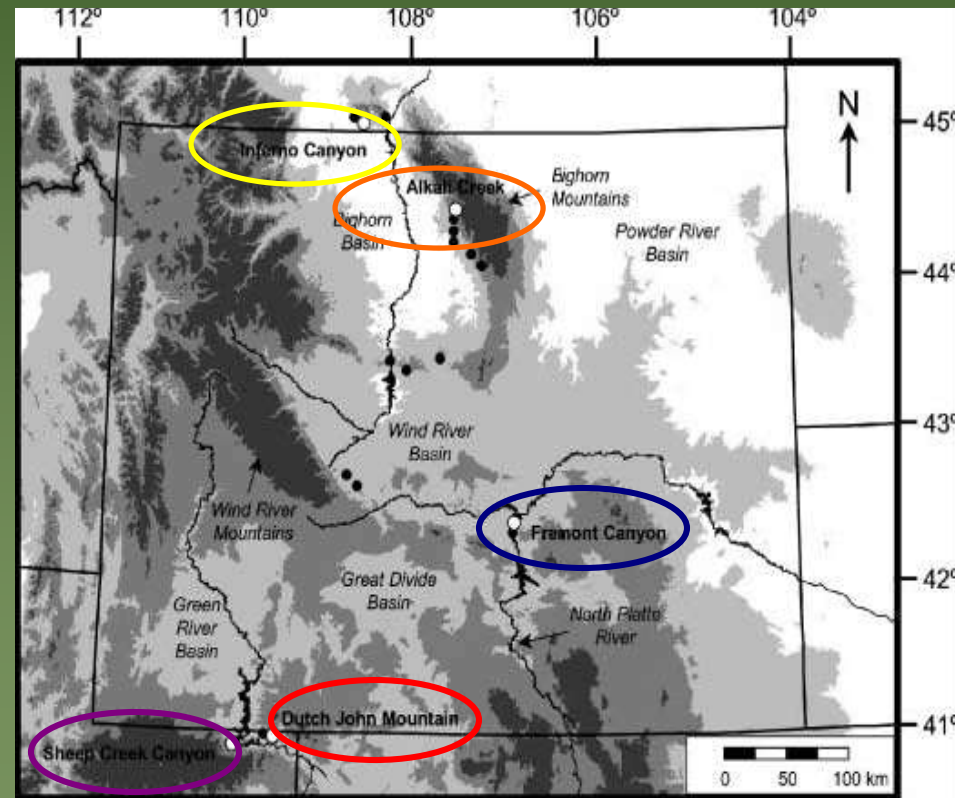
# Vegetation Study



- ◆ In 2000, Dr. Mark Lyford and Dr. Stephen Jackson collected vegetation plots and woodrat middens
- ◆ Northeastern Utah, Western Wyoming, Southeastern Colorado, and Southeastern Montana.

# Research Focus

- ◆ Comparing pollen data with the surrounding vegetation data
  - 30 m radius
- ◆ 5 different sites
  - Fremont Canyon
  - Sheep Creek Canyon
  - Dutch John Mountain
  - Alkali Creek
  - Inferno Canyon



# Method

- ◆ Modern Middens
  - Fremont Canyon 5/13
  - Sheep Creek Canyon 5/11
  - Dutch John Mountain 5/11
  - Alkali Creek 2/5
  - Inferno Canyon 5/19
- ◆ Total of 59 middens collected
- ◆ Count 22 random samples



<http://www.digitalsmicroscope.com/microscope-images-2/>

# Method Continued

## ◆ Vegetation Plots



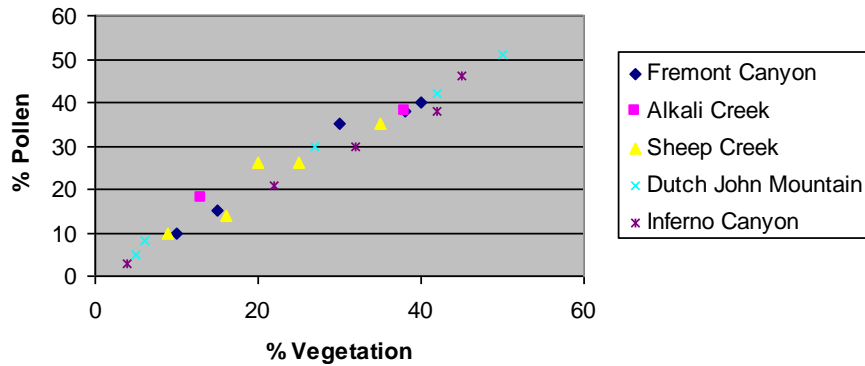
# Method Continued

- ◆ Count 300 pollen grains from 22 samples
- ◆ Determine percent composition
- ◆ Compare to vegetation percentages within a 30 m radius

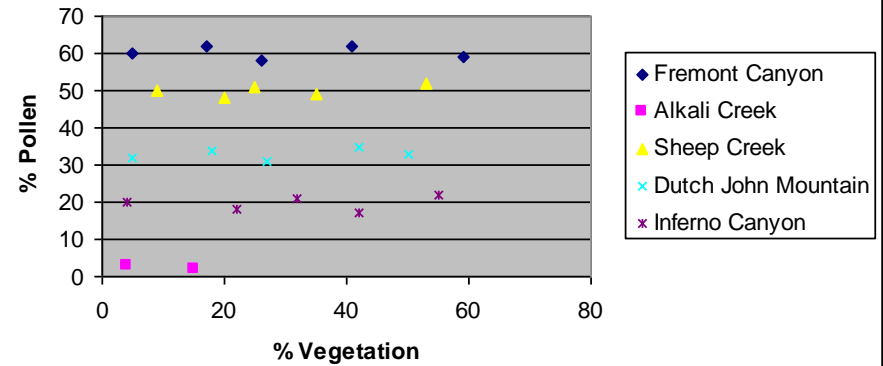


# Hypotheses

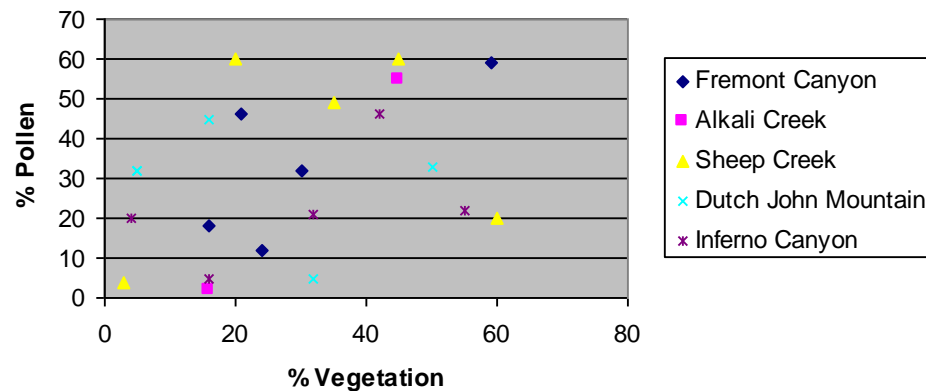
### Strong Local Signal



### Strong Regional Signal

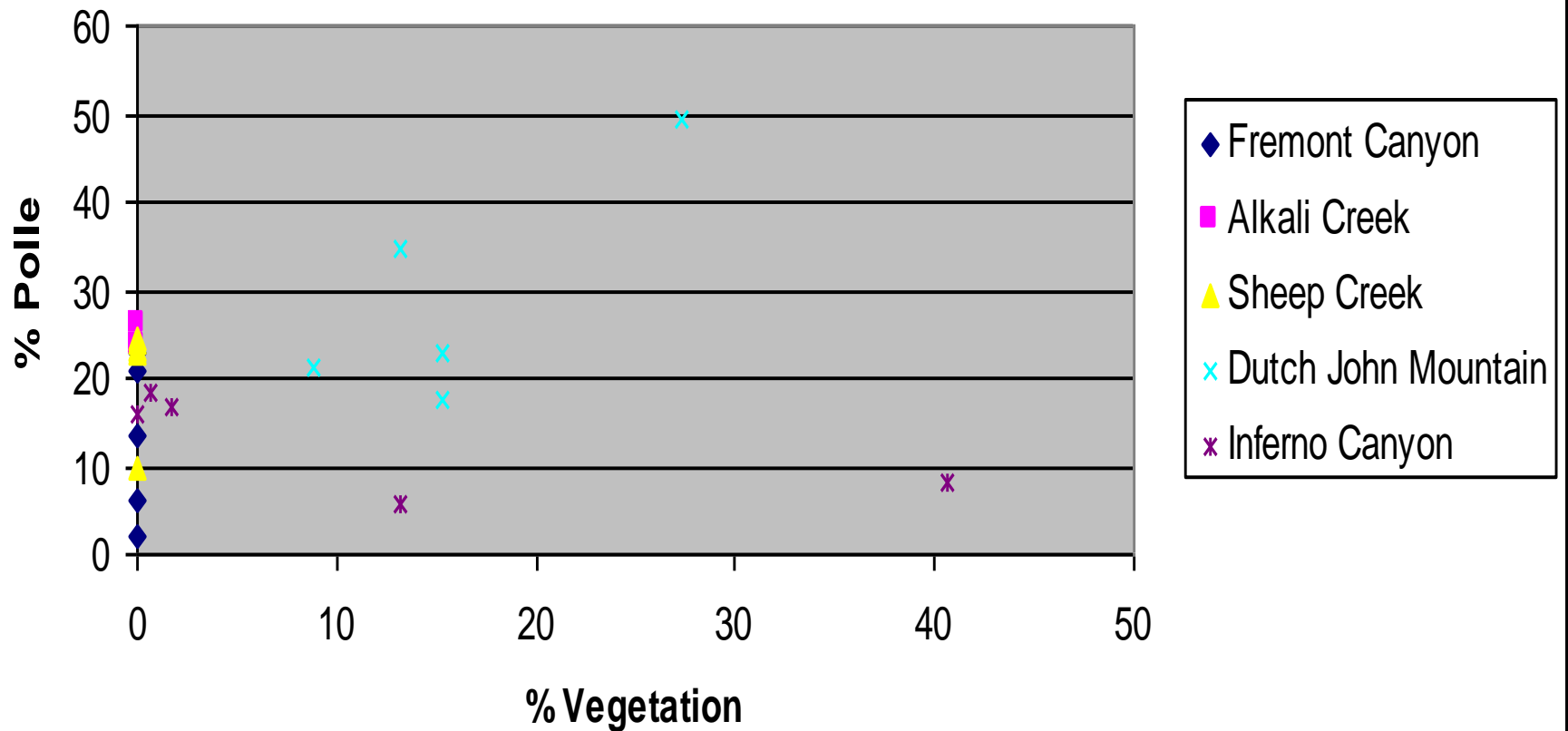


### Something Else? "Noise"



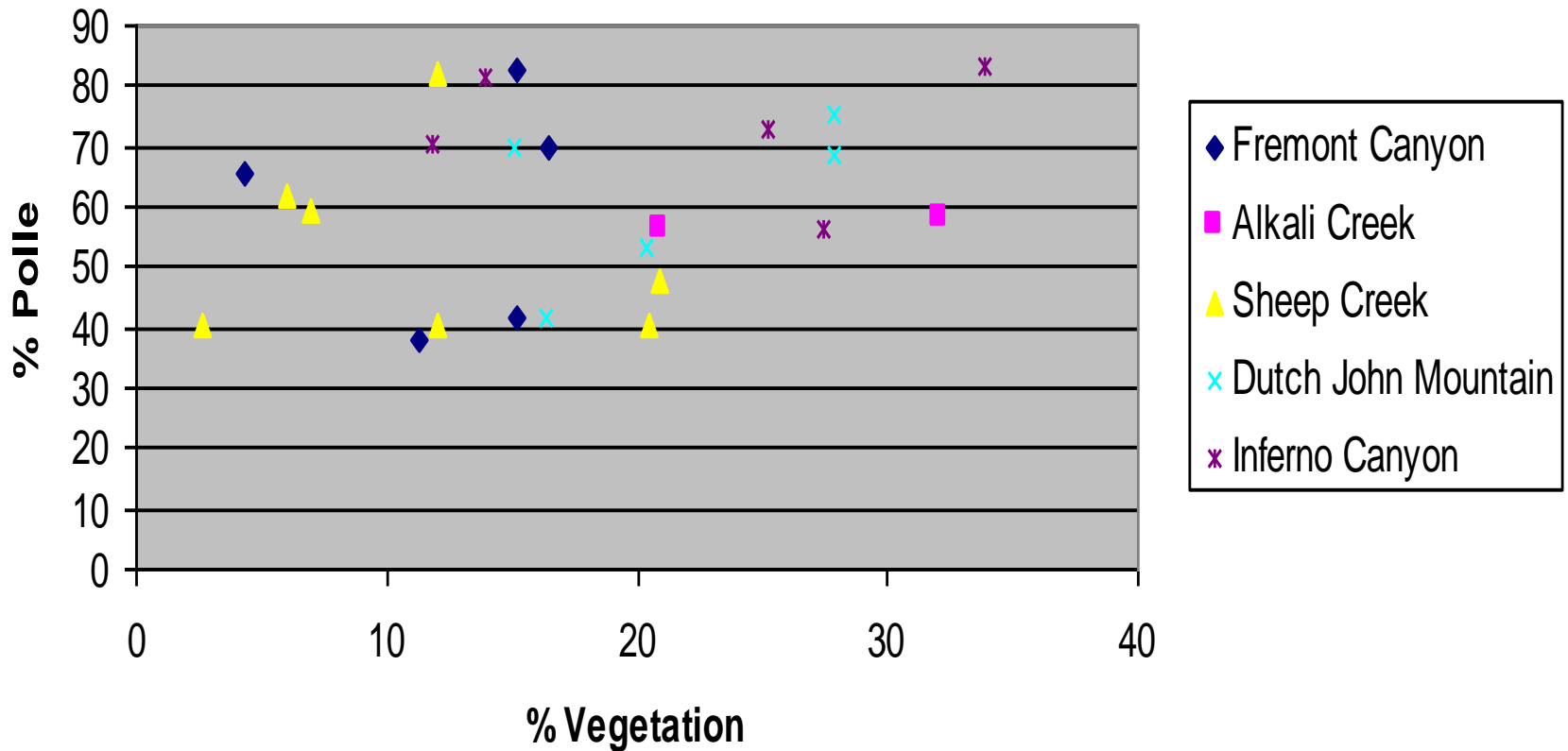
# Results

## Pinus



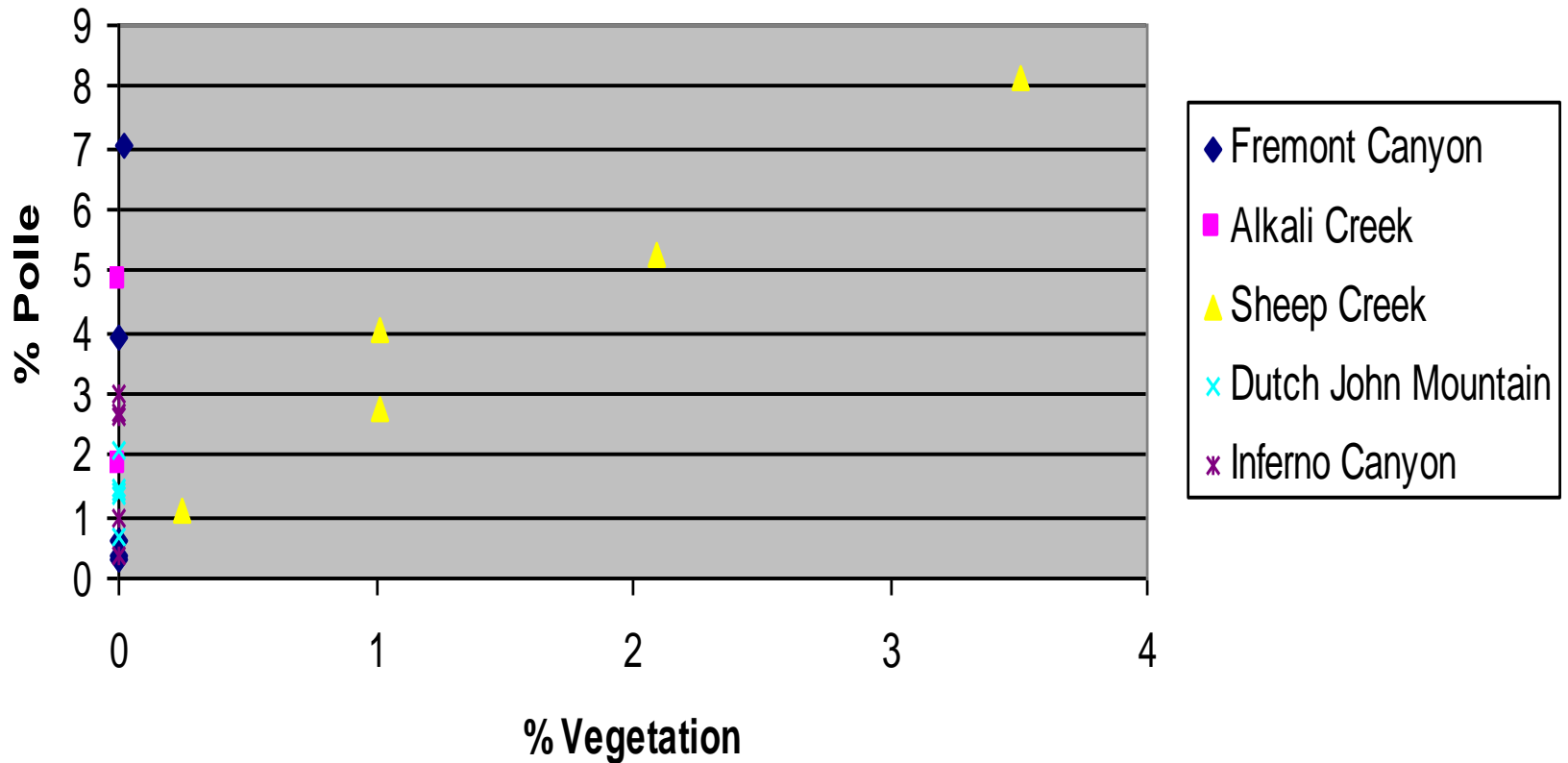
# Results

## Cupressaceae



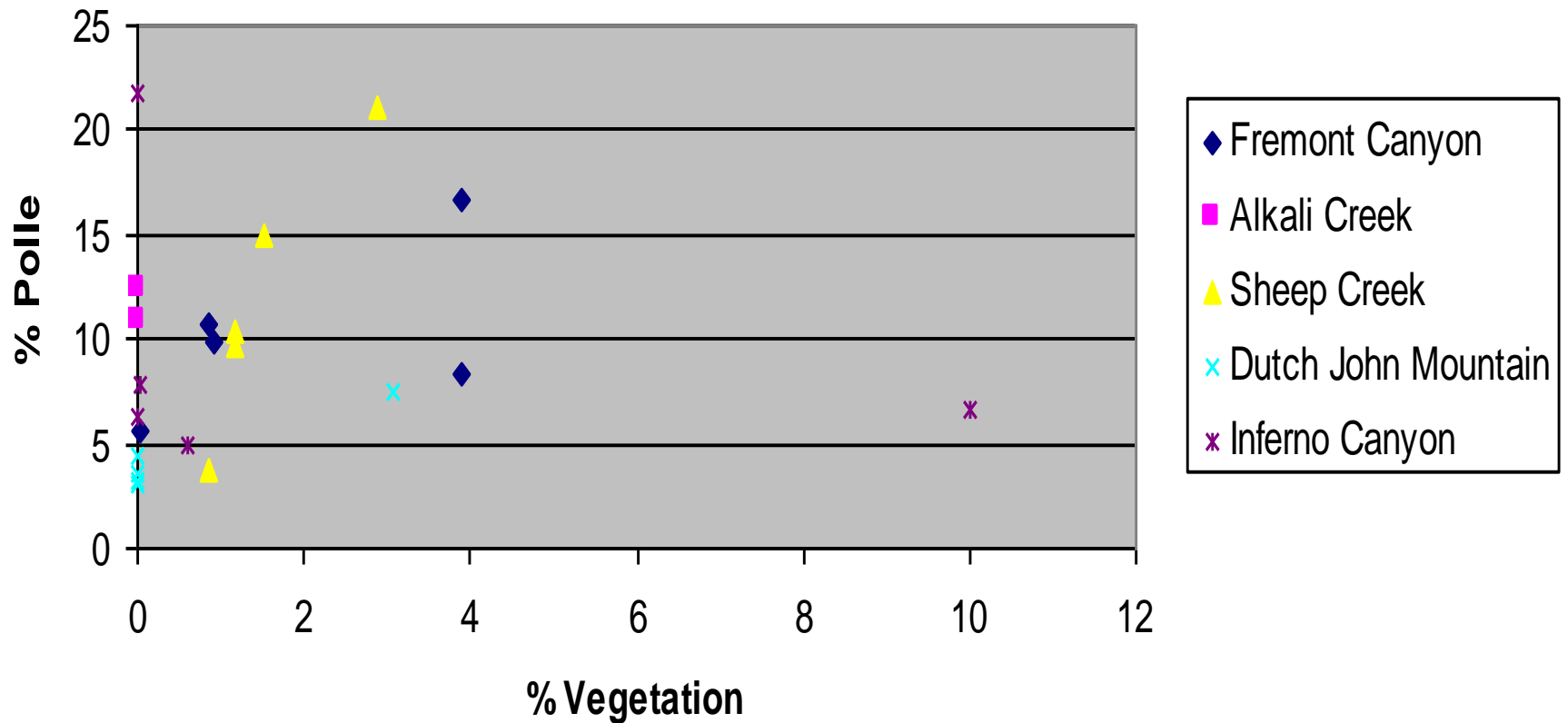
# Results

## Chenopodia



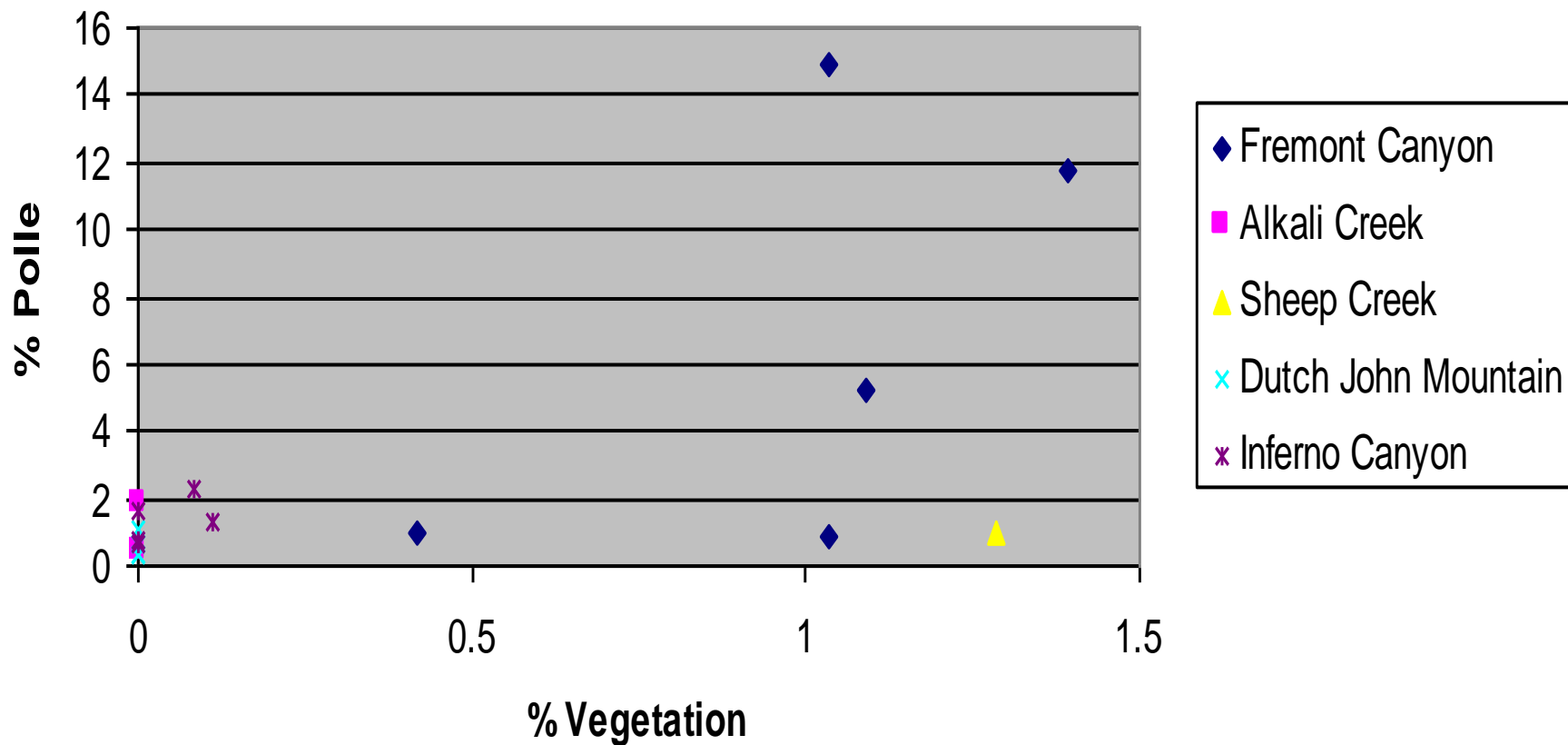
# Results

## Artemisia



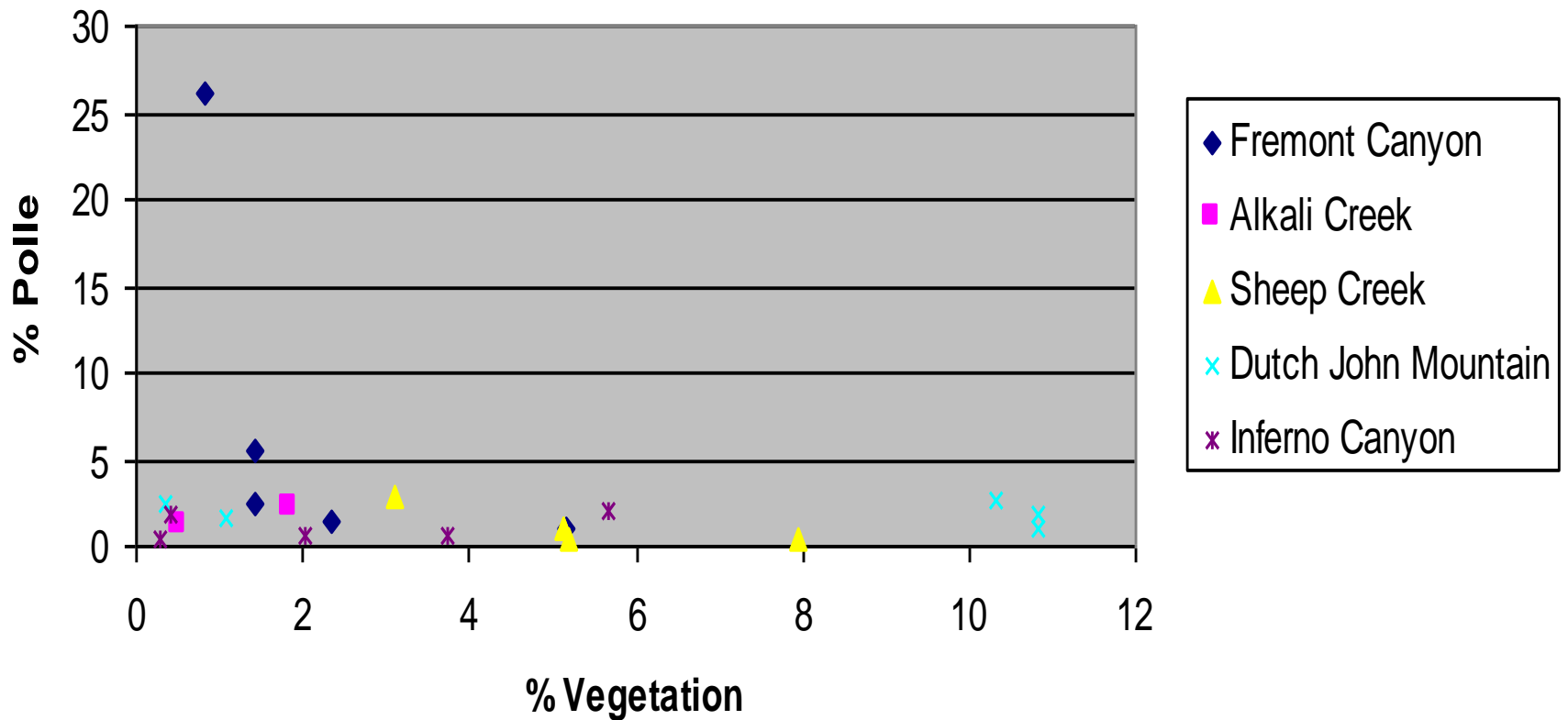
# Results

## Asteraceae



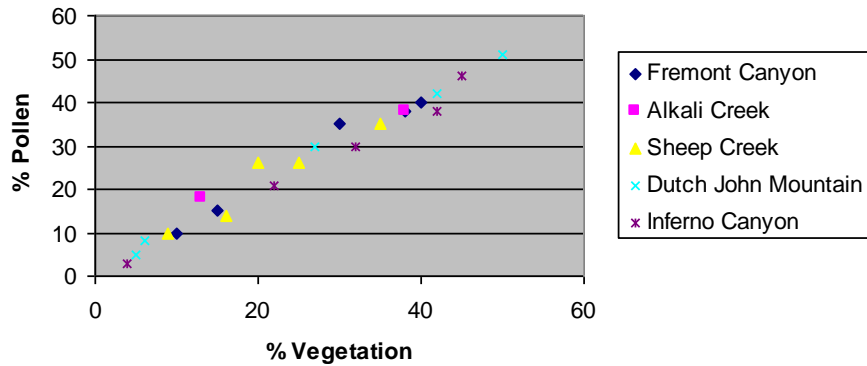
# Results

## Poaceae

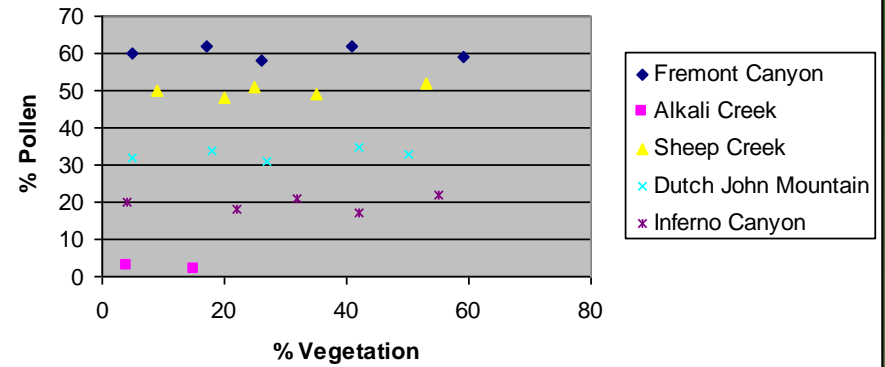


# Comparing?

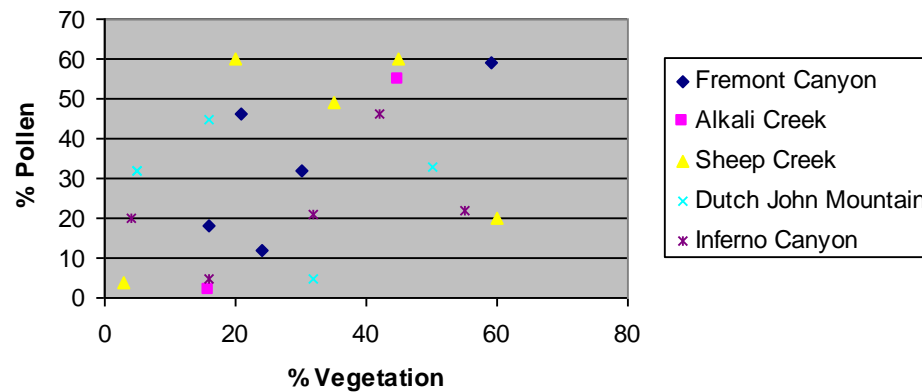
### Strong Local Signal



### Strong Regional Signal



### Something Else? "Noise"



# Conclusion

- ◆ Something else?
- ◆ Noise
  - Signal unsure
- ◆ Small regional signal



# Conclusion


- ◆ How does pollen get into a midden?
  - Wind
  - Attached to plant debris
  - Other?
  
- ◆ Why not a stronger signal?
  - Introduce different sites
    - ◆ Northeastern Colorado



# References

- ◆ Jackson, S.T., J. L. Betancourt, M.E. Lyford, S.T. Gray, and K.A. Rylander. 2005. A 40,000-year woodrat-midden record of vegetational and biogeographical dynamics in north-eastern Utah, USA. *Journal of Biogeography*, 32, 1085-1106.
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- ◆ Lyford, M. E., S.T. Jackson, S.T. Gray, and R.G. Eddy. 2004. Validating the use of woodrat (*Neotoma*) middens for documenting natural invasions. *Journal of Biogeography*, 31, 333-342.
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- ◆ Retrieved images from [http://www.aquariumofpacific.org/onlinelearningcenter/full\\_description/desert\\_woodrat/](http://www.aquariumofpacific.org/onlinelearningcenter/full_description/desert_woodrat/)
- ◆ Retrieved images from <http://www.bio.davidson.edu/people/vecase/behavior/Spring2008/Kiss/index.html>
- ◆ Retrieved images from <http://www.geo.arizona.edu/palynology/geos462/28packrats.html>

# Special Thanks

- ◆ Dr. Stephen Jackson
  - ◆ Dr. Mark Lyford
  - ◆ Jennifer Andersen
  - ◆ Jackson's Lab
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<http://www.geo.arizona.edu/palynology/geos462/28packrats.html>

# Questions?