Status of Konza Small Mammal Research 2018

Andrew G Hope
Sabrina Gragg
Agustin Jimenez-Ruiz (SIU)
Vasyl Tkach (UND)
Jesse Nippert

Konza Small Mammals Are:

- **Consumers – herbivores, granivores/frugivores, insectivores**
- Seed dispersers – larder hoarders
- Sources of fertilizer – excrement, urine
- Sources of disturbance – positive, negative
- **Hosts to parasites and carriers of disease – complex life cycles, zoonotics**

Questions

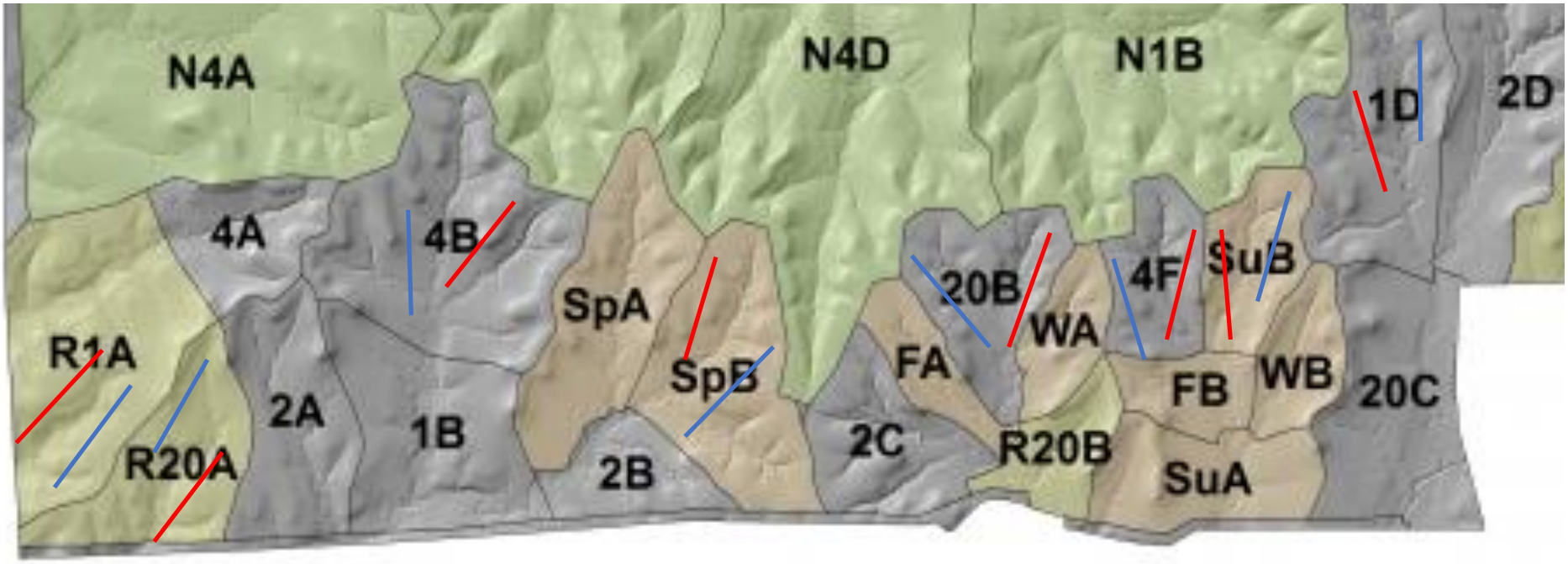
1. How do small mammal community dynamics vary across grazing and fire treatments? (Kaufman)

2. As consumers:
   a) **How does diet vary by species, by experimental treatment, and through time?**
   b) What is the relative importance of small mammals vs. other consumer groups
   c) What are they eating?

3. As parasite hosts:
   a) **What are the parasites and pathogens occurring on Konza?**
   b) Is prevalence of parasites/pathogens influenced by experimental treatment?
   c) What are the co-evolutionary relationships between hosts and parasites (generalist vs. specialist parasites)?

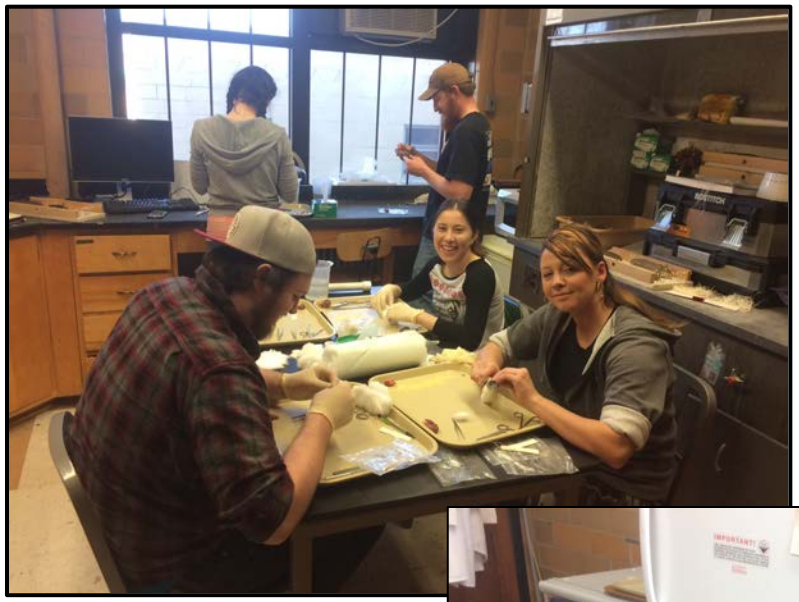
Field Sampling

- 5 years (2016-2020), sampling once per year (summer)
- 8 watersheds (1D, SpB, SuB, 4B, 4F, 20B, R1A, R20A)
- 2 transects/treatment, 40 traps each, 4 nights
- blue=catch and release, red=specimen removal



Lab Methods 1

- Specimen curation
- Collection of tissues
  - Organs
  - Fur
  - Parasites
  - Skeletons



Lab Methods 2

- Identification of parasites
- 3 new species of nematodes
  - 2 from least shrews
  - 1 from pocket mice
- Lyme-positive shrews
- Ongoing biodiversity surveys

Stable Isotopes, Consumer Niches, Woody Encroachment

- Analyze C and N isotopic ratios to investigate differences in dietary niche:
  - Intra-specific and inter-specific
  - Seasonal (intra-annual):
    - Fur – reflects spring diet
    - Liver – reflects summer diet
  - Inter-annual variation – 2016, 2017
  - Variation across watersheds:
    - Annual
    - 4 Year
    - 20 Year

Bia Gragg – ArtSciUGO Scholarship 2018

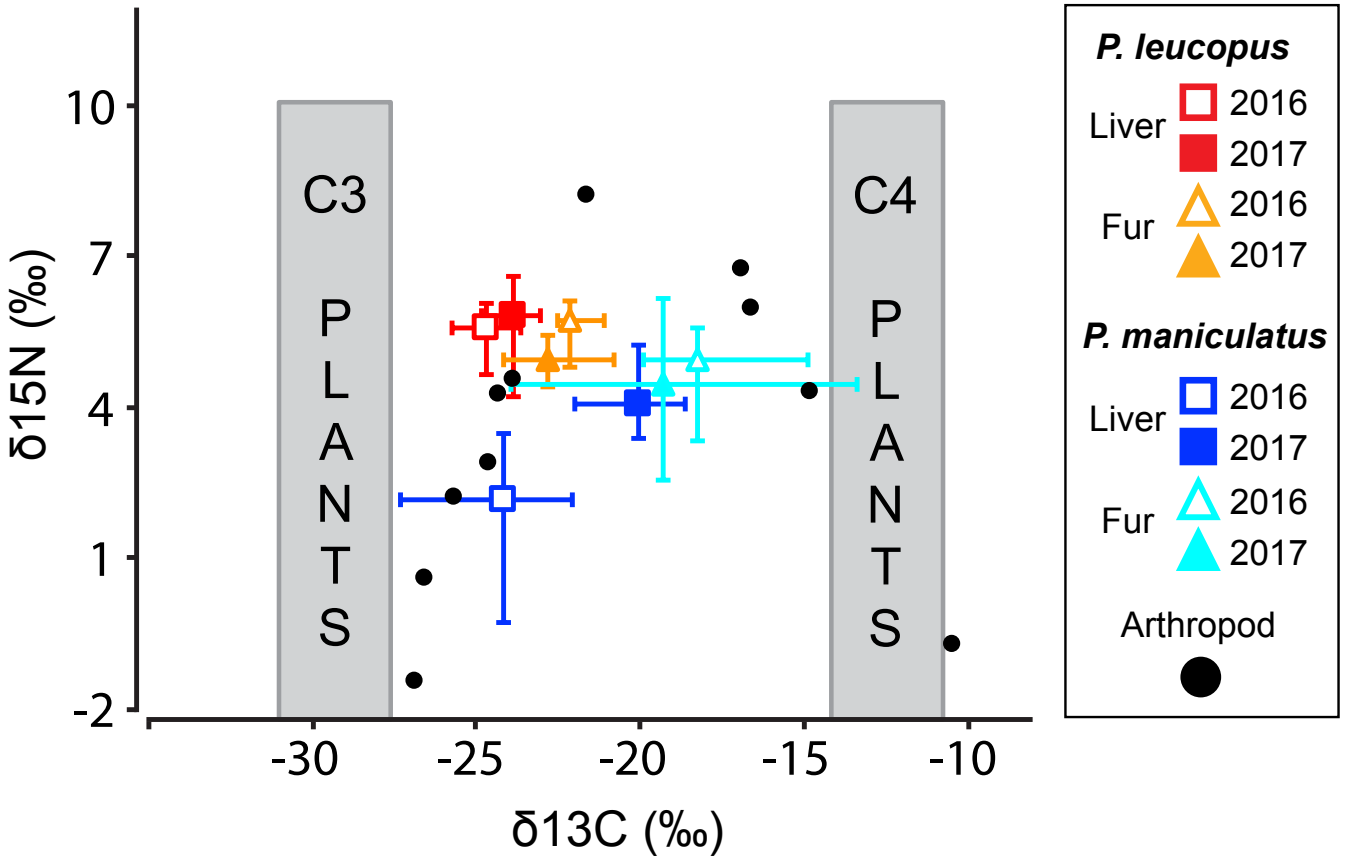
Hypotheses

1. Resource use by small mammals will be significantly different between grassland and woodland habitats

2. Dietary breadth of species will be greater in the more floristically diverse woody habitats

3. Dietary niche will be more stable through time in woody habitats than in grasslands which experience higher variability through seasonal fire and greater exposure

Preliminary Results – 2 species (white-footed/deer mouse), limited samples



- Different fundamental niches
- Variability:
  - Intra-annual
  - Inter-annual
- Generalist Diet

Conclusions?

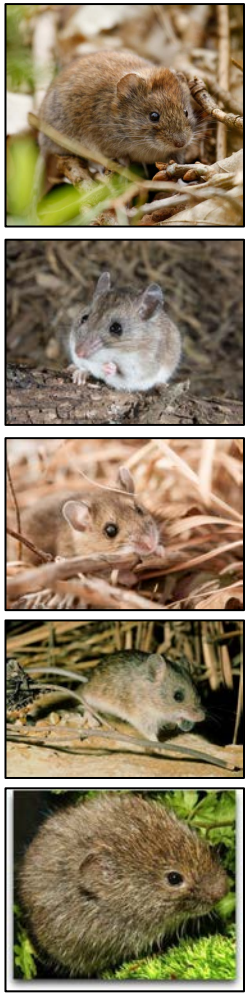
- As grasslands experience woody encroachment, consumers change, along with resource use.

- Woody habitats appear to provide a narrow and stable diet compared with grasslands.

- But…
  - What are they actually eating?
  - What about these species in other habitats?
  - What about other species (Community Dynamics)?

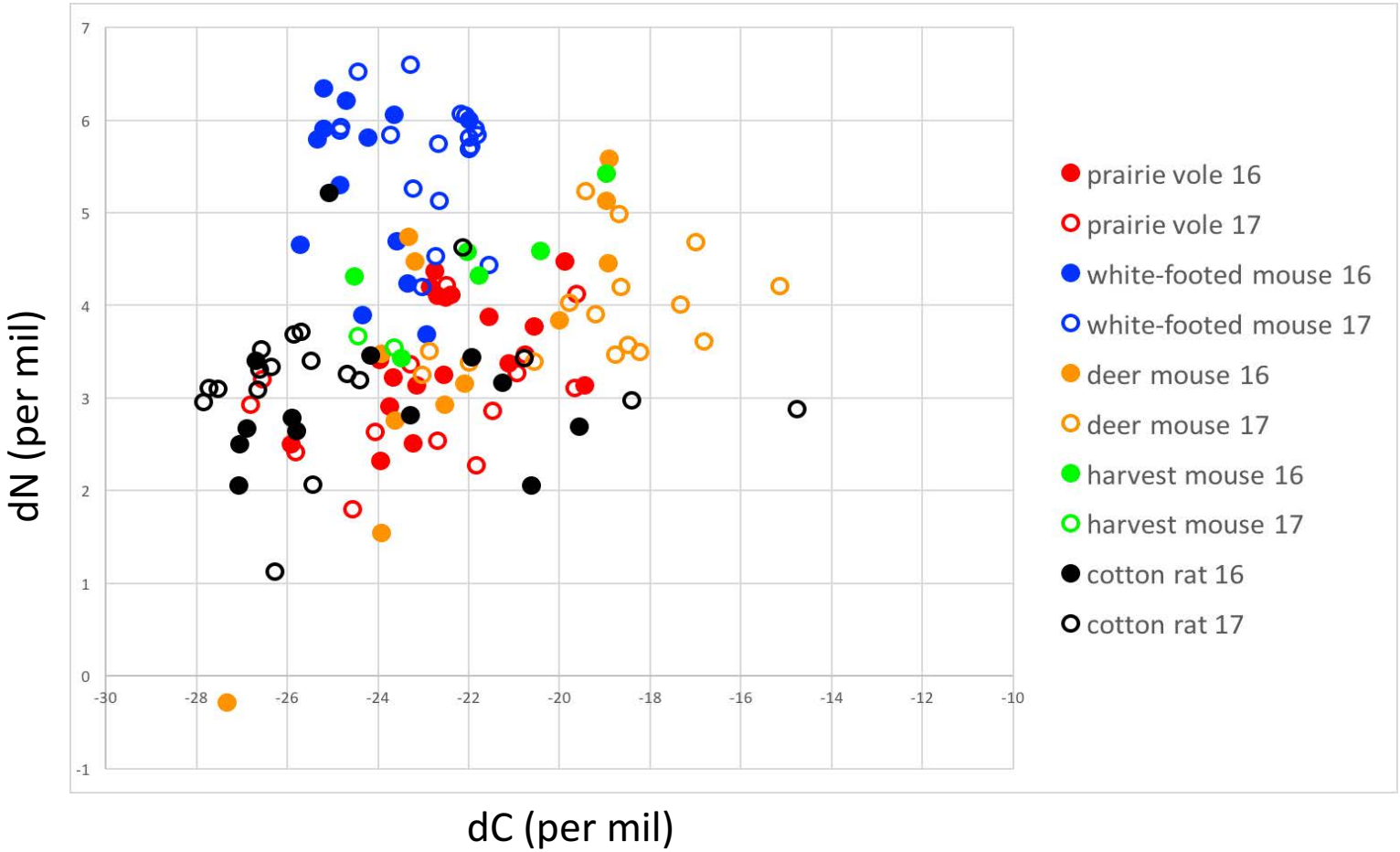
Sampling – 5 dominant species

- Prairie vole: N=32 – Annual, 4 Year, Reversal (R1A)
- White-footed mouse: N=32 – 4 Year, Reversal, 20 Year (20B)
- Deer mouse: N=28 – Annual, 4 Year, Reversal
- Harvest mouse: N=8 – Annual, 4 Year
- Cotton rat: N=32 – 4 Year, Reversal, 20 Year



Whole Community

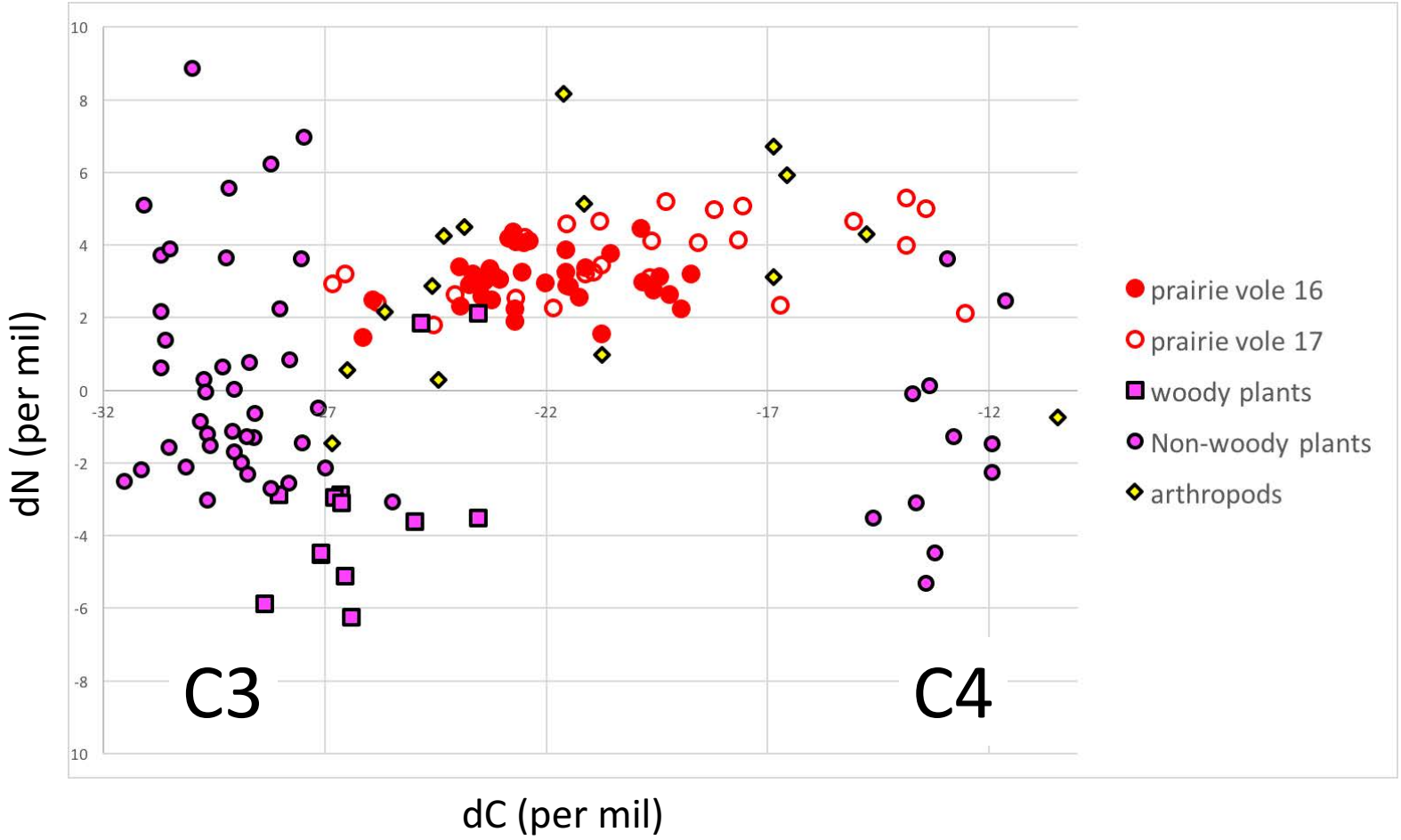
Liver (Summer Diet)



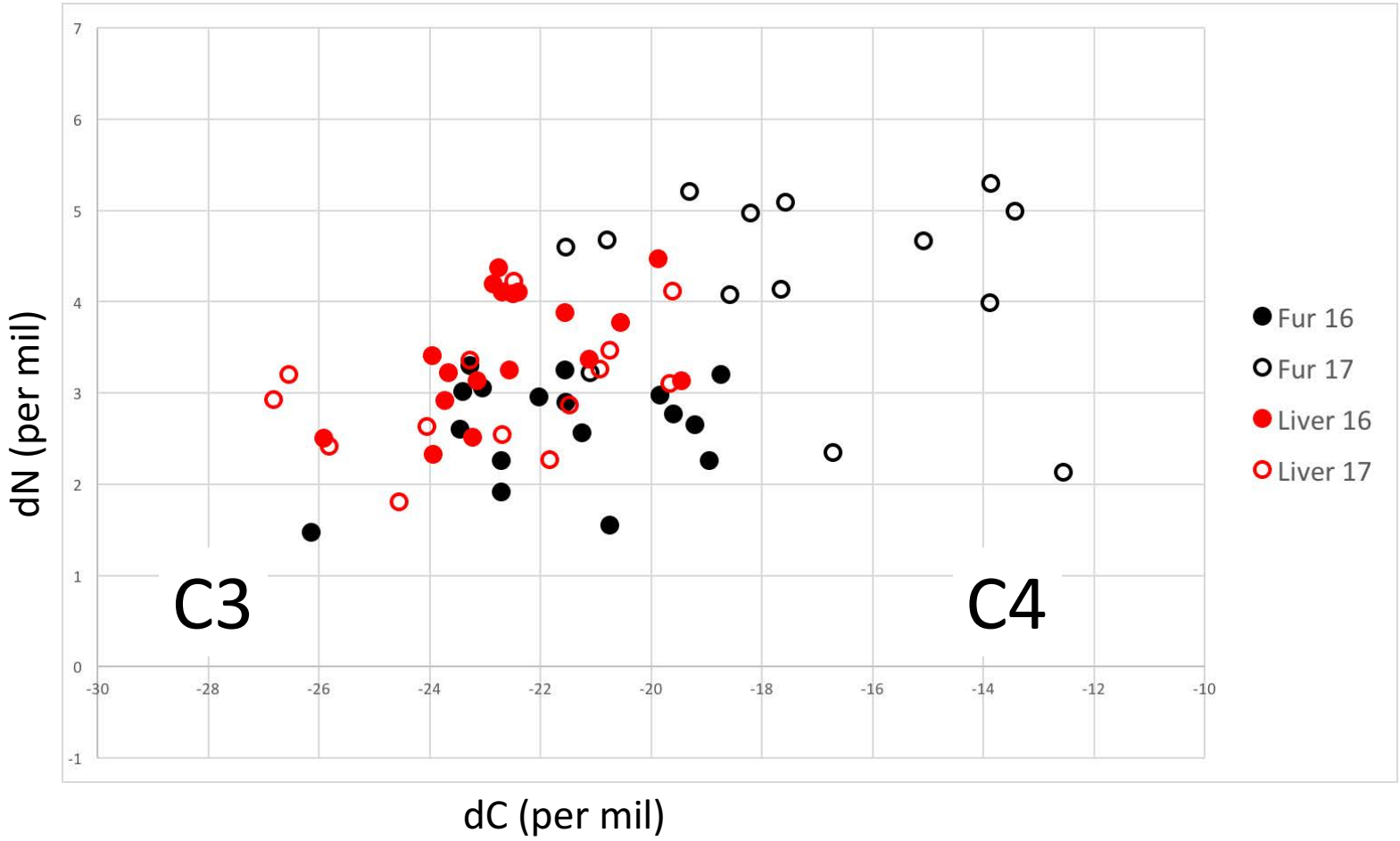
Example: Prairie vole

- Generally a grassland species
  - Annual
  - 4 Year
  - Reversals
- True Herbivore

Inter-annual Variation in Carbon

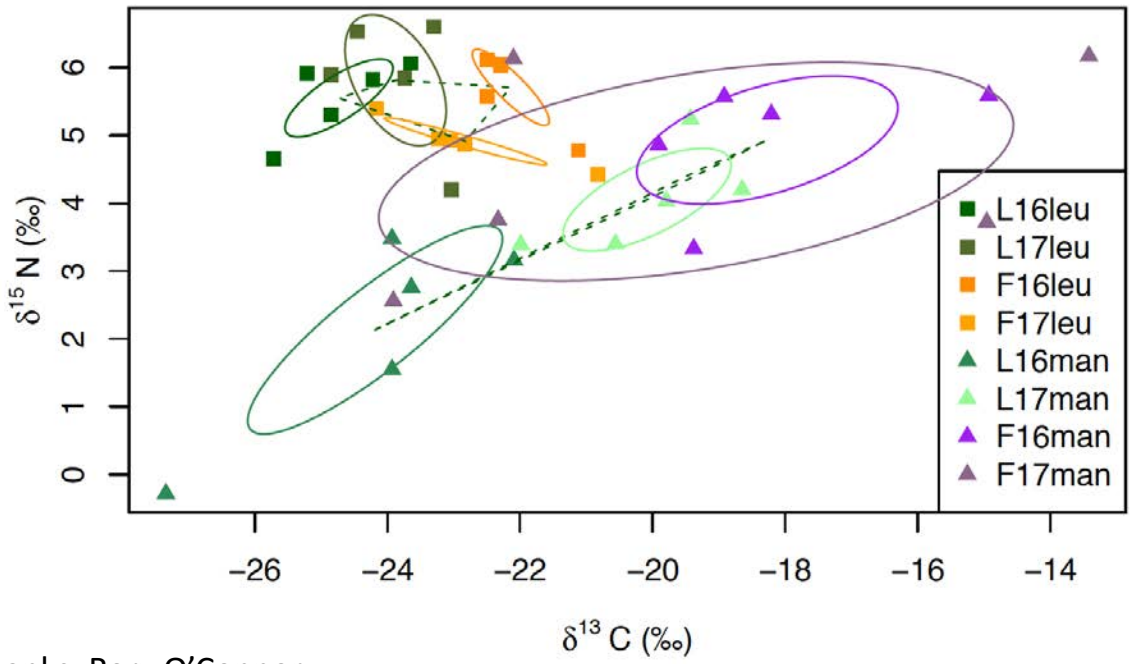


Season-specific Nitrogen Shifts



Next Steps

- Multi-variate Statistics
  - Niche ellipses
  - Niche overlap
  - Temporal shifts through niche space
  - Bayesian Mixing Models
    - Food group assignments



Thanks: Rory O'Connor

KONZA PRAIRIE BIOLOGICAL STATION

KONZA PRAIRIE LTER

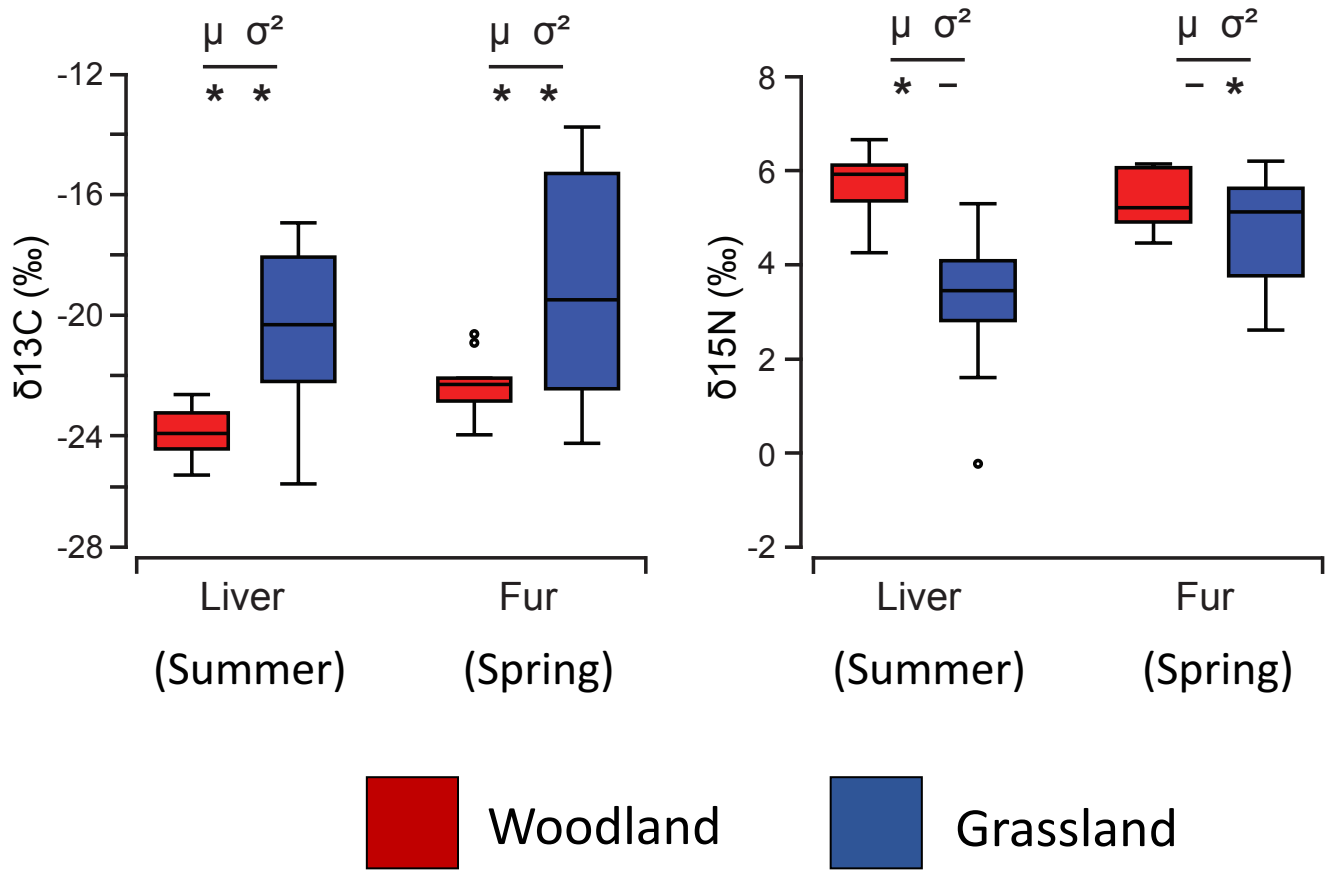
NSF

The Nature Conservancy
Protecting nature. Preserving life.

LTER

Questions or discussion?

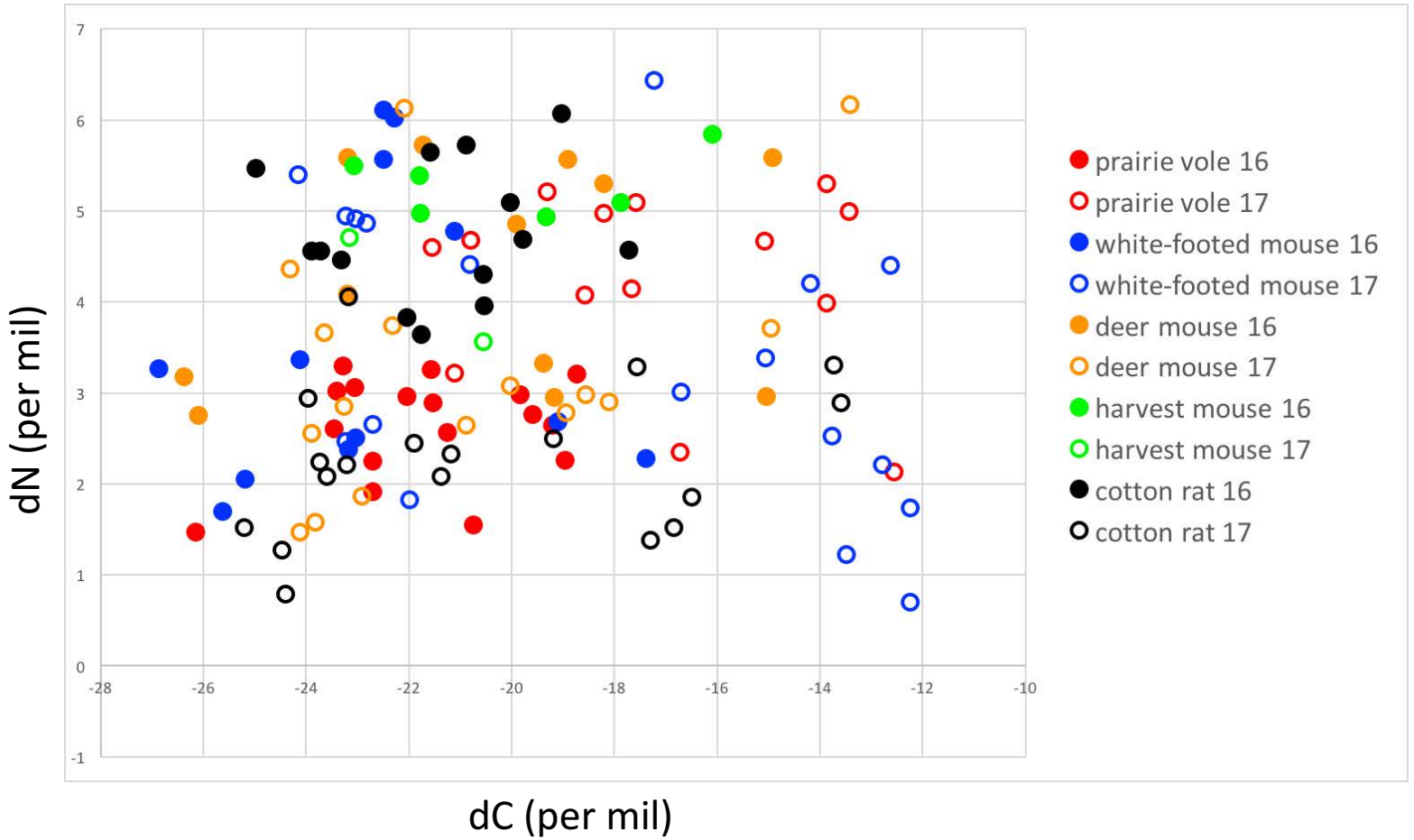
Preliminary Results – Continued…



- Different mean and variance
- Woodland Diet:
  - Narrow
  - Stable
- Grassland Diet:
  - Broader
  - More variable

Whole Community

Fur (Spring Diet)



Intra-specific variation among treatments?