

Elemental Ecology
SIBER Exercise
Due at Beginning of Class on Thursday November 18th

Problem #1: Sevilleta Smammal SIBER!

As you know, my lab group traps small mammals at the Sevilleta National Wildlife Refuge (SNWR) monthly from March to November. This work is inspired by a previous study by Blair Wolf (UNM Biology) and his previous students Alaina Pershall-Zimmerman and Robin Warne. Our present work is using a combination of stable isotope analysis and direct measurements of small mammal body condition to provide a mechanistic framework for understanding how consumer diets are influenced by climate-mediated seasonal shifts in resource availability. One of our primary approaches is quantifying the isotopic niche of each small mammal species over time and then measuring the degree of overlap among species, which provides a proxy for resource competition in response to shifts in the abundance of composition of potential resources (plants).

In the associated Excel spreadsheet are blood plasma $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values for five species of small mammals captured during three consecutive (2005–2007) summer monsoon seasons (July–September) from a mixed shrubland (creosote) and grassland (grama) site on the Sevilleta NWR. Please use SIBER to answer the following questions. **Remember, you will need to convert these data into appropriate files and formats for use in SIBER. Refer to our in-class SIBER demonstration for example.**

- 1) Using SIBER, quantify the $\delta^{13}\text{C}$ versus $\delta^{15}\text{N}$ isotopic niche (SEA in $\%_2$) of each of the five species for *each* monsoon season. **Please summarize your results in a table** and provide a short narrative on the interesting patterns you observe, including some ideas for what might be causing any trends you see in the data.
- 2) Conduct a brief literature search to find information about average rainfall and temperatures during the monsoon season over the time period represented in the dataset. Summarize your results in a table below. Please include your citations.
- 3) Lastly, pick **two** species and discuss how their isotopic niches have changed over the time period examined in response to (or maybe not) the climatic variables you described above. Provide some pretty graphs and a short narrative on the patterns you've observed. Be sure to address not only changes in the size of the isotopic niche, but also changes in the **location and/or shape** of the isotopic niche. Include some ideas for what might be causing trends in the data.