

# ace

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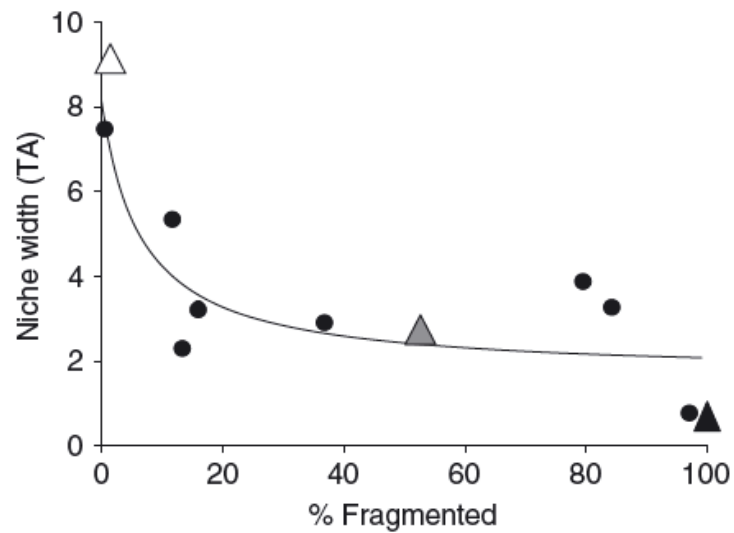
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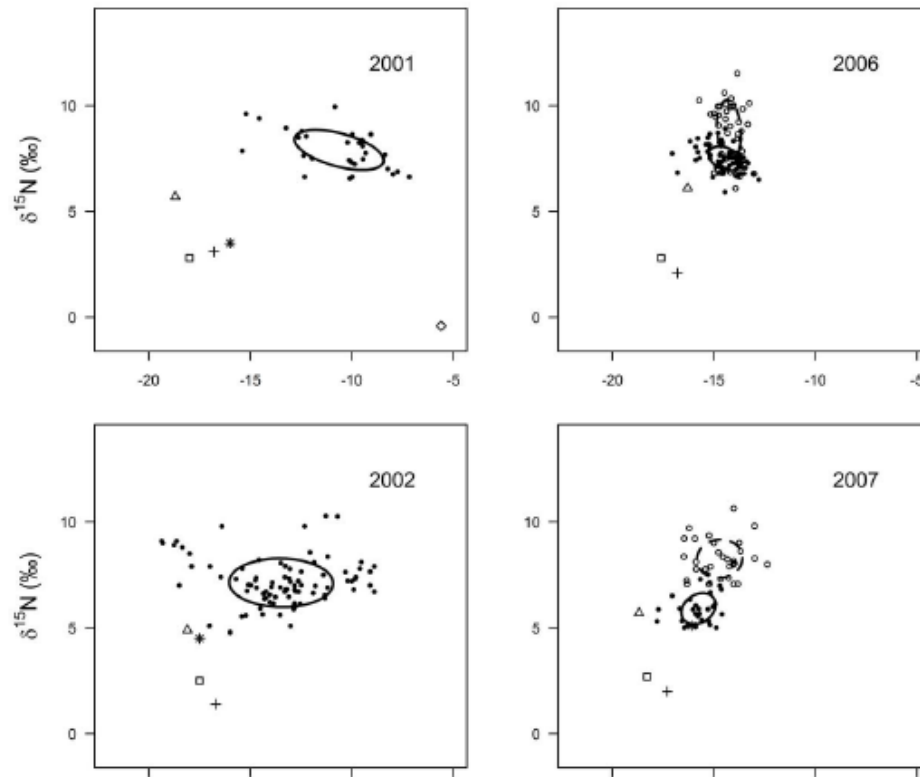
# Drivers of niche width



**Figure 2** Niche width plotted as a function of percent fragmentation, with niche width estimated as convex hull area (TA) encompassing 13 individuals in each population. Each symbol represents the estimated niche width of a gray snapper population in one of 11 tidal creek systems, with triangles corresponding to the

4/19

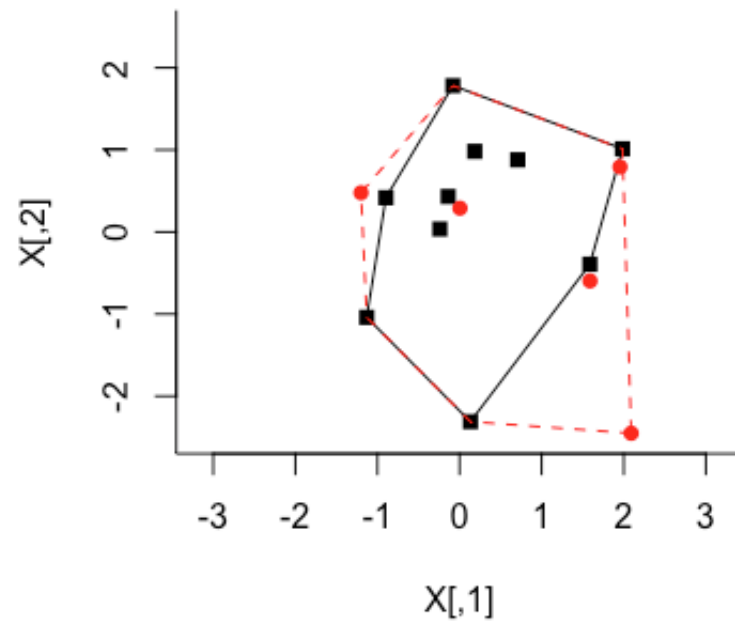
# Invasive species



5/19

# The problem with convex hulls

They can only get bigger.



6/19

# SIBER

# Journal of Animal Ecology



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## Comparing isotopic niche widths among and within communities: SIBER – Stable Isotope Bayesian Ellipses in R

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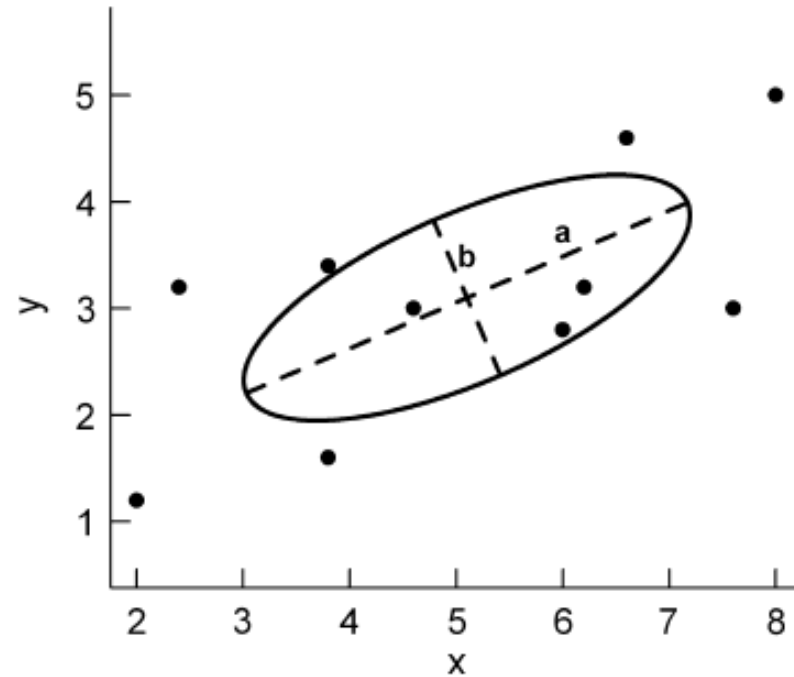
<sup>3</sup>Department of Statistics, School of Mathematical Sciences, University College Dublin, Dublin 4, Ireland

7/19

## The standard ellipse

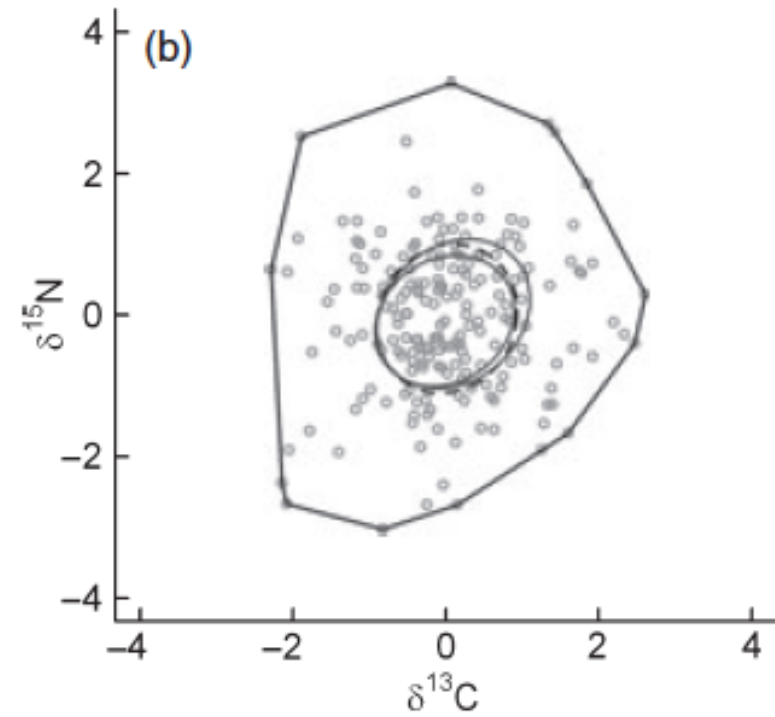
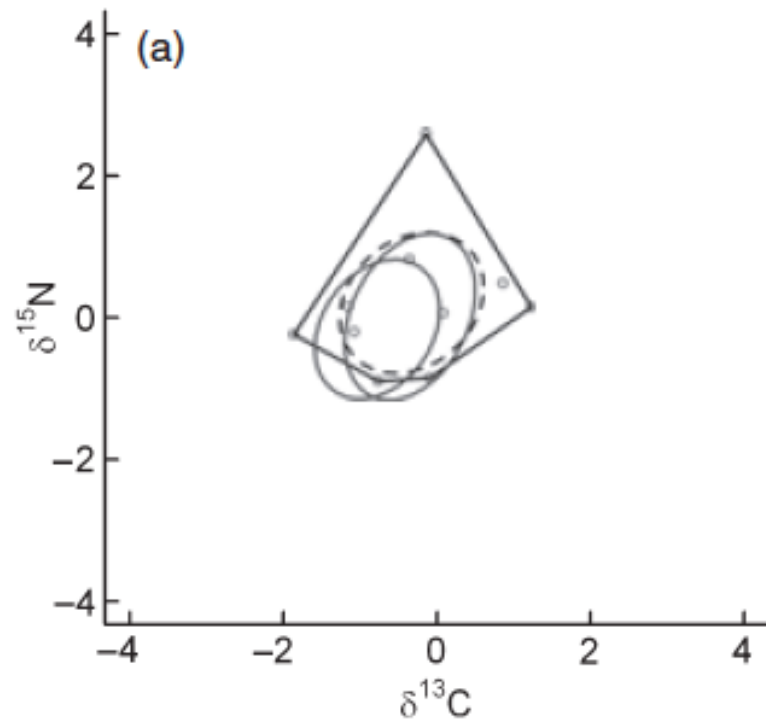
- $a$  = semi-major axis length
- $b$  = semi-minor axis length
- $\text{Area} = \pi * a * b$

- contains  $\approx 40\%$  of the data
- located by the means of X and Y
- shape and size determined by covariance matrix  $\Sigma$



8/19

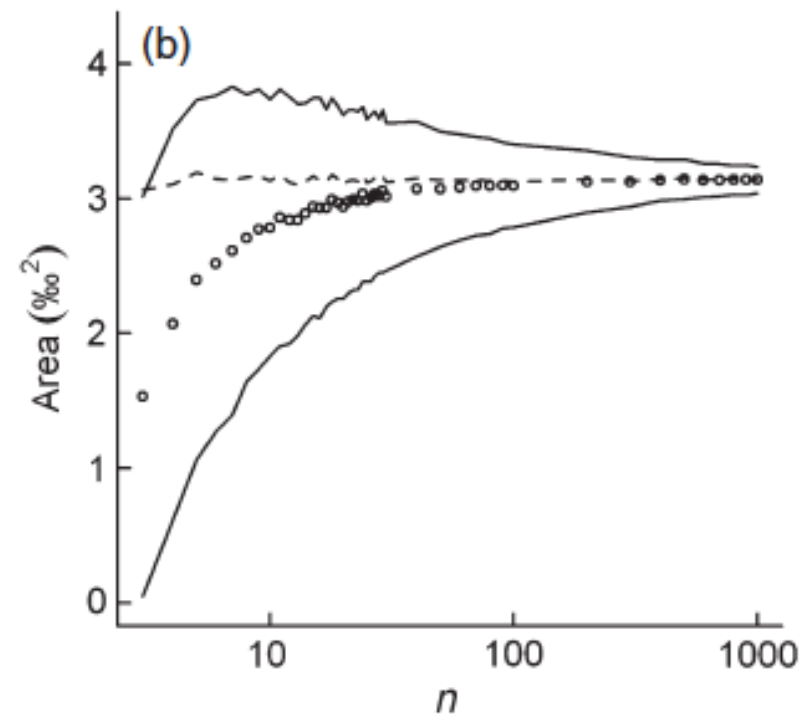
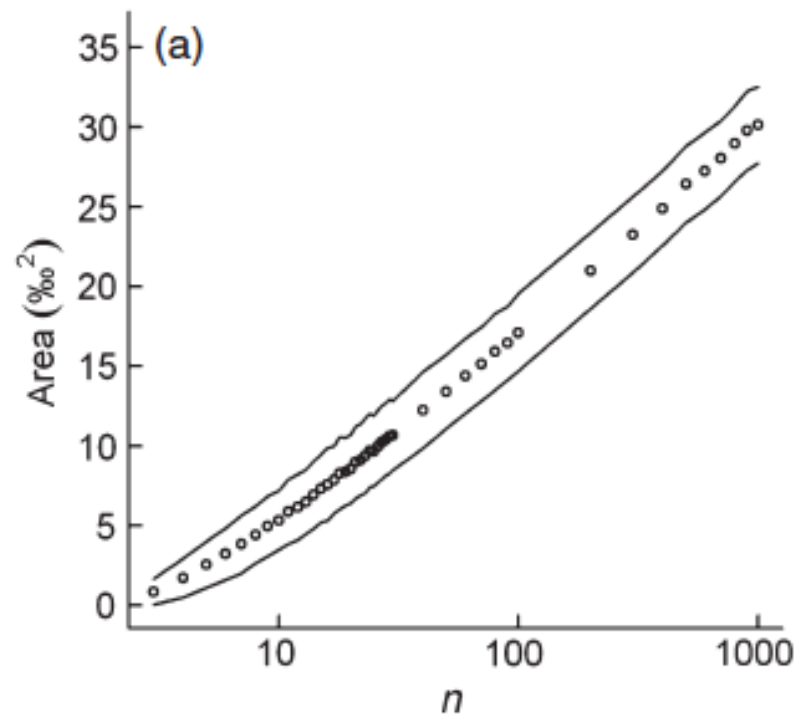
## Uncertainty of the ellipse



9/19

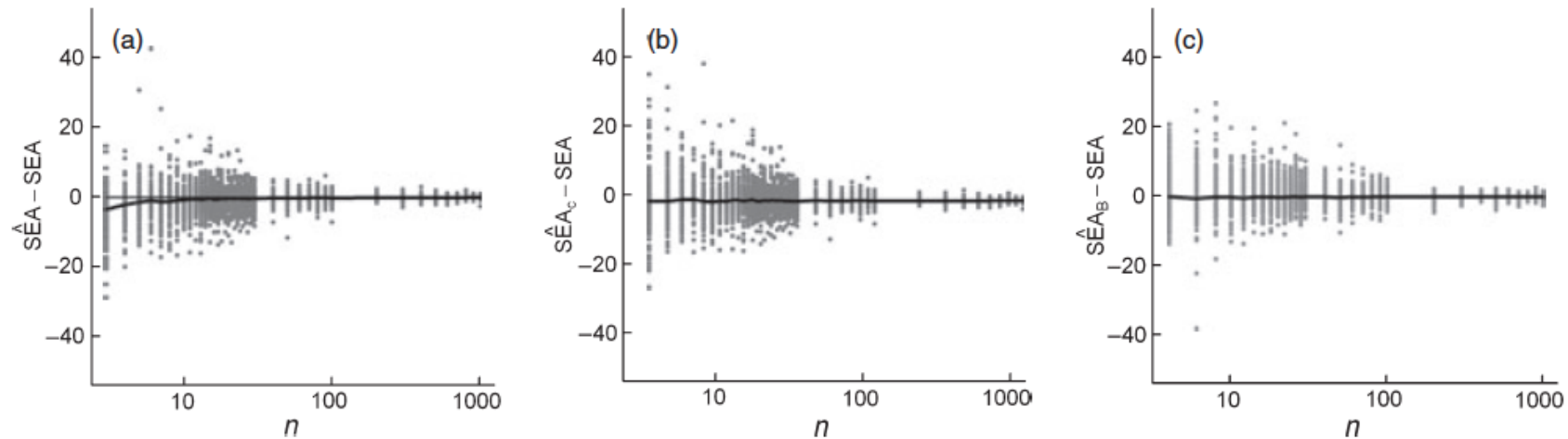
# Sample size, ellipses and hulls





10/19

# Sample size and bias in ellipse estimation

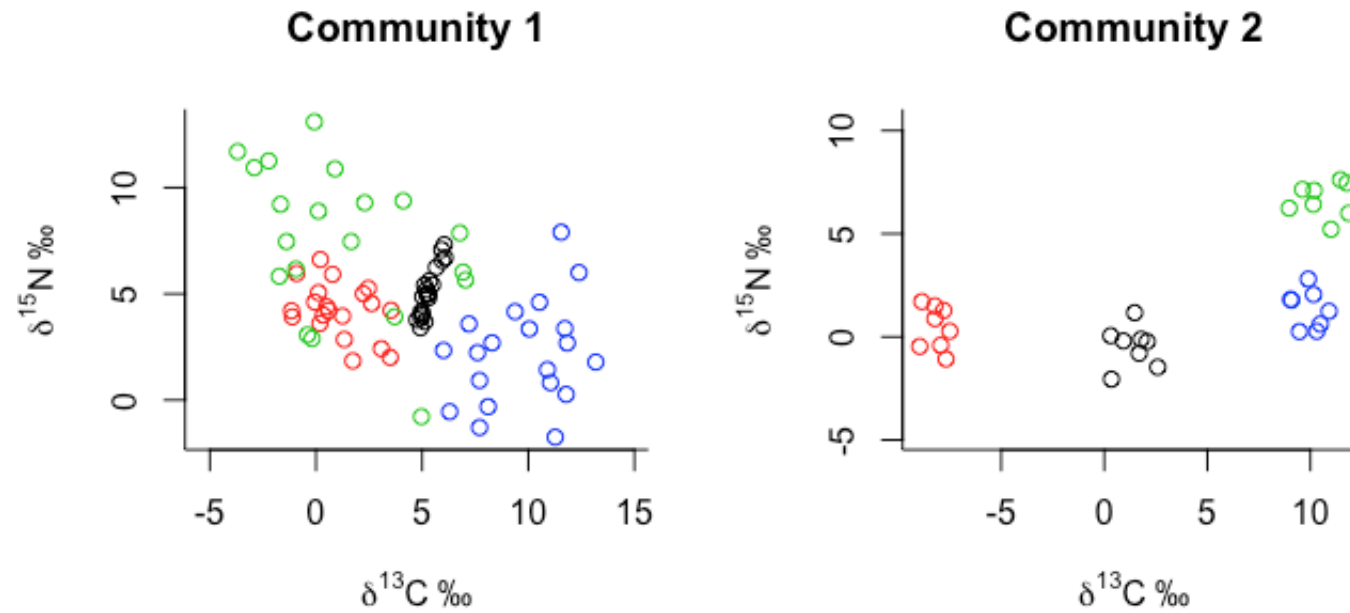


a = SEA, b = SEAc and c = SEA\_B

11/19

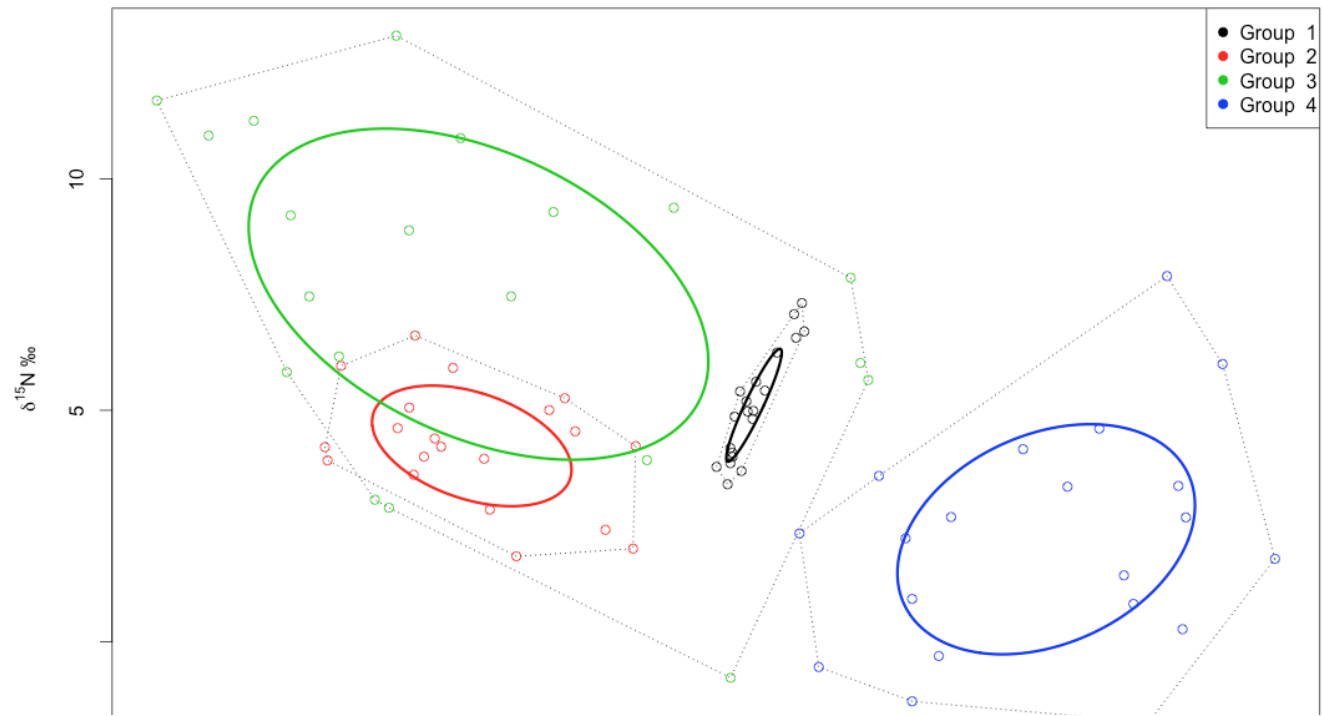
## SIBER has two quite different routines

- Question is: do you want to compare populations within a community, or make comparisons across entire communities?



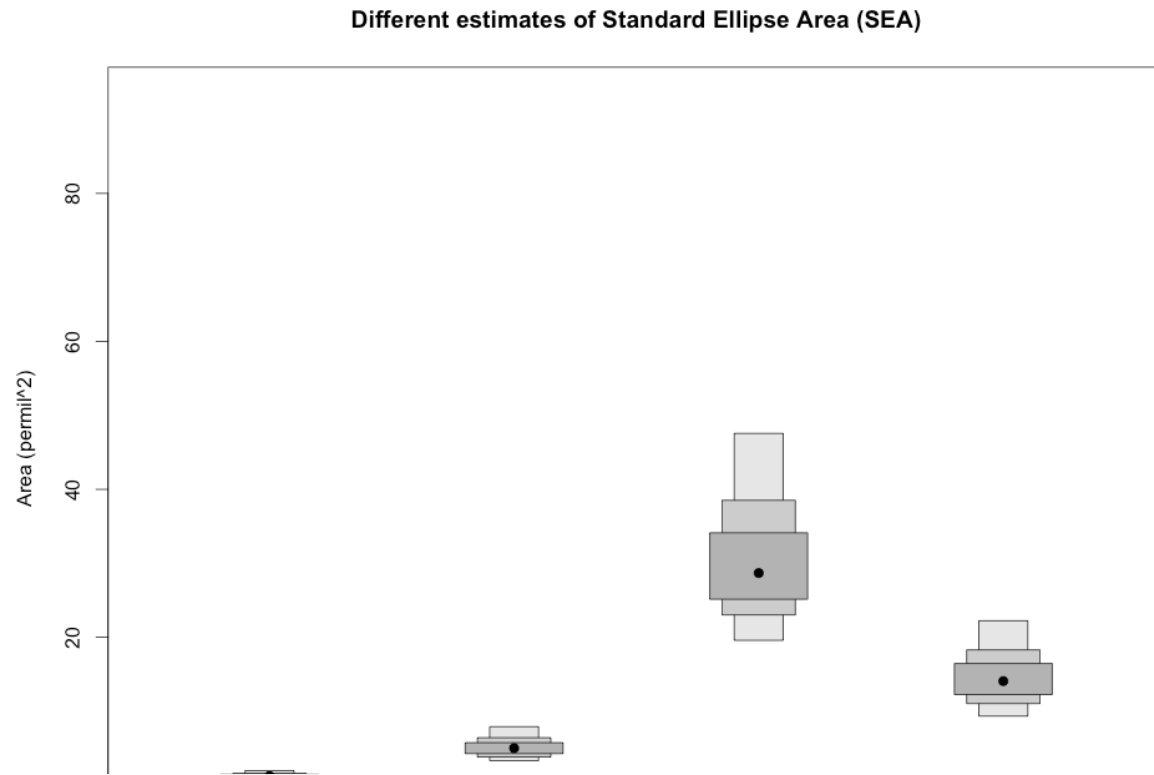
12/19

# Comparisons of populations



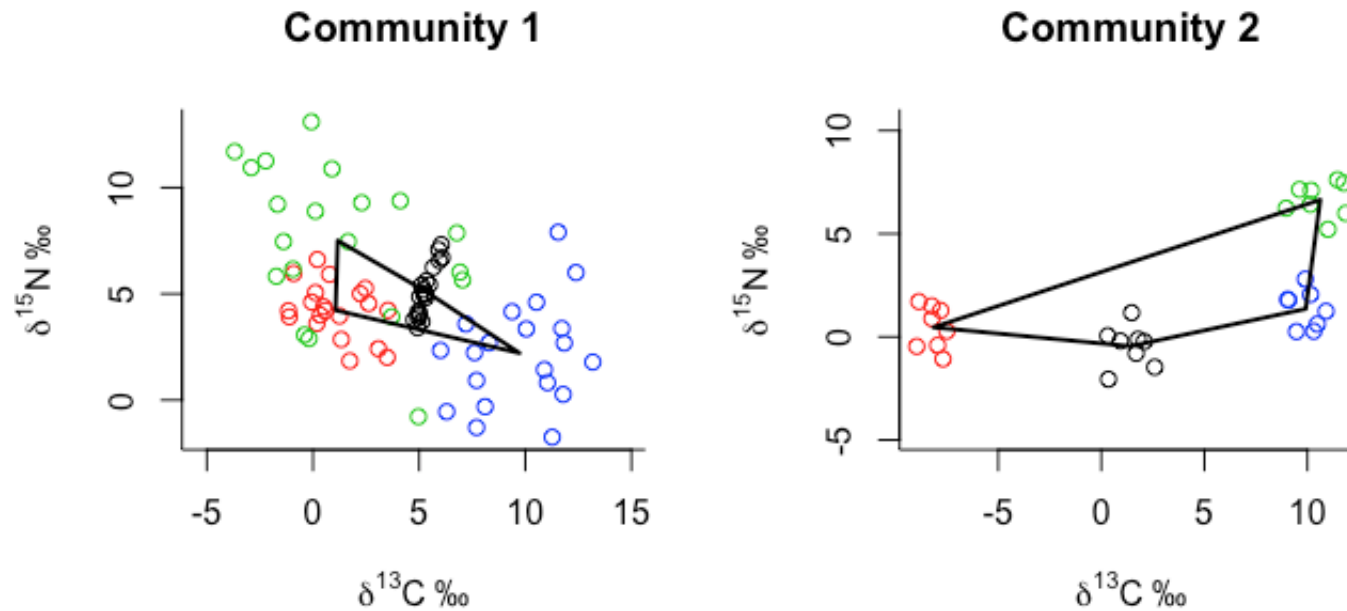
13/19

# SIBER output



14/19

# Comparisons of communities



15/19

## Layman metrics

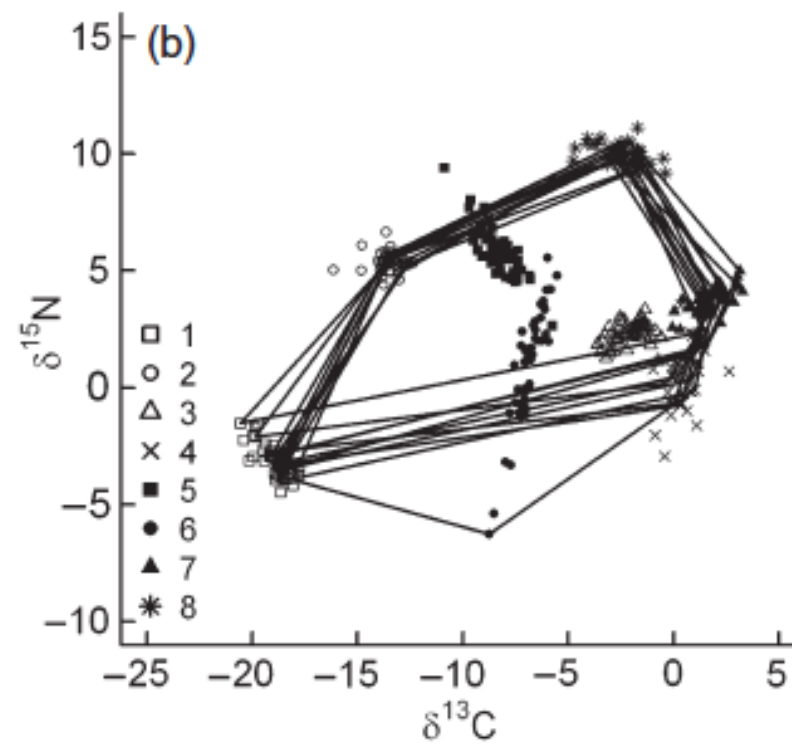
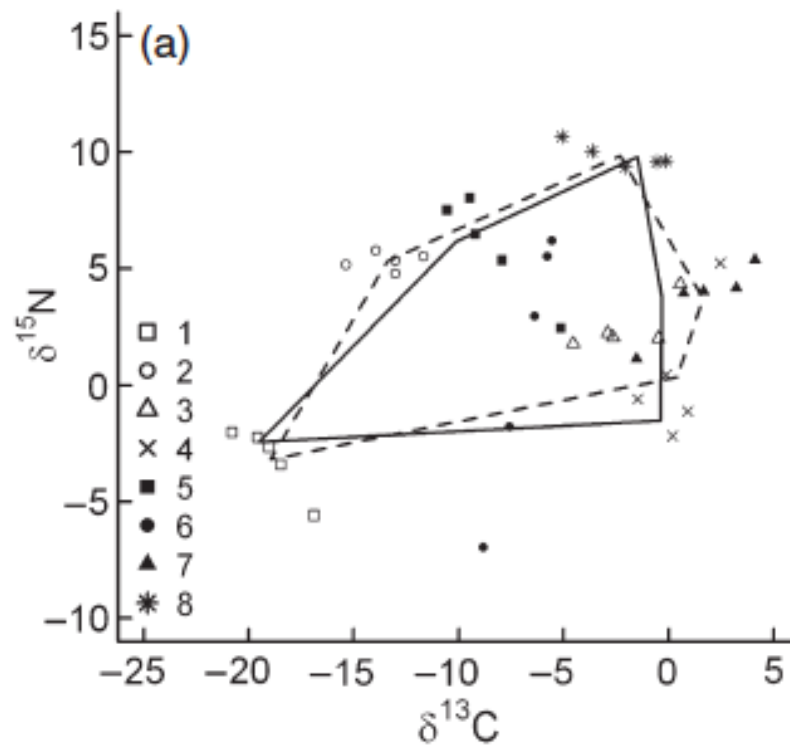
- **TA** - the area of convex hull containing, in the case of SIBER, the means of the populations that comprise the community.
- **dN\_range** - the distance in units between the min and max y-axis populations means which is most often d15Nitrogen in ecological

studies.

- **dC\_range** - the distance in units between the min and max x-axis population means which is most often d13Carbon in ecological studies.
- **CD** - the mean distance to centroid from the means
- **MNND** - the mean nearest neighbour distance of the means
- **SDNND** - the standard deviation of the nearest neighbour distance

16/19

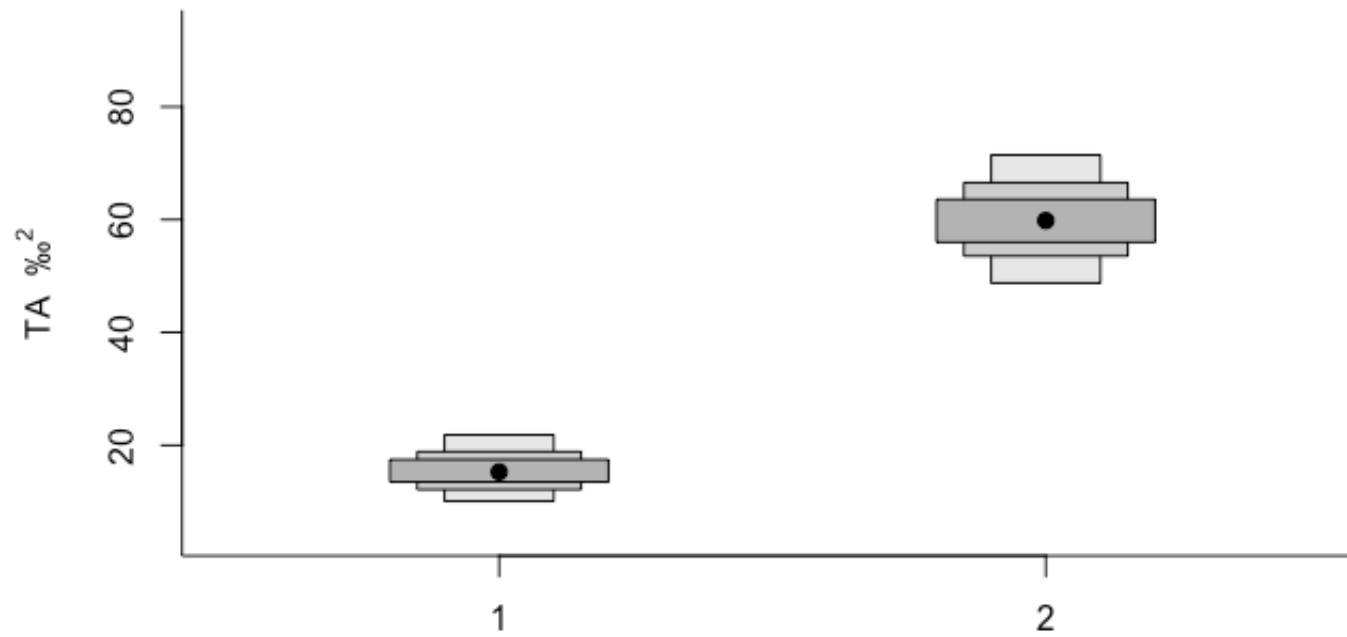
# Calculate metrics based on ellipses fitted to populations



17/19

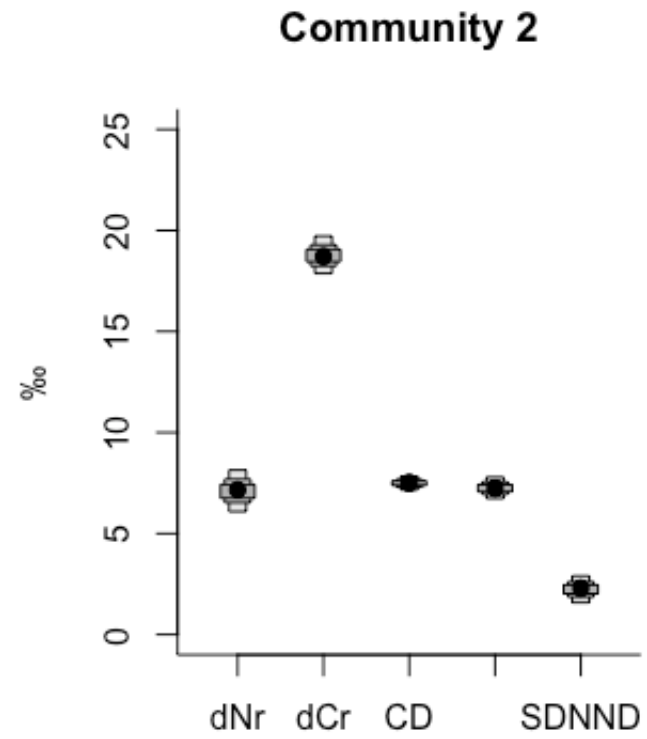
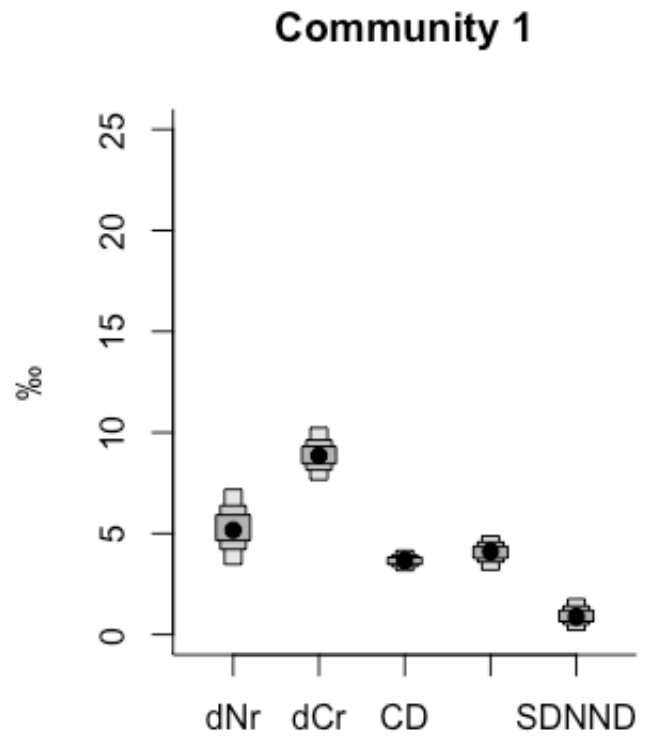
# Bayesian Convex Hulls (TA)





18/19

# And the other 5 metrics



19/19