Suppose that we have focused on location and species

Suppose that we have 2 groups and that, after we remove the i-th individual, we have .

Furthermore, after removing the i-th individual, we also have and

Our formulation for the Negative Binomial distribution is such that

These expressions are conditional on (i.e., we do not integrate over this set of parameters)

#---------------------------------------------------------------

Multinomial piece

#---------------------------------------------------------------

Negative binomial piece

Let

This implies that

#---------------------------------------------------------------

We can combine both pieces to get:

Taking logs, this becomes: