Suppose that we have focused on location and species

Suppose that we have 3 groups and that, after we remove the i-th individual, we have .

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

Here are the expressions after integrating out some of these parameters:

Multinomials are in red, Poissons are in black.

Notice that things in other locations and other species are irrelevant. This allows us to cut a bunch of things:

We can also get rid of some of the factorials, gamma functions, and other terms:

Re-organizing these terms and simplifying a little bit more, we get: