Rather than assume that any one mechanism, be it niche-based or neutral, dominates the assembly of populations into a community, theories based on statistical mechanics assume that all mechanisms could be valid, but their unique influence has been lost to the enormity of the system and thus outcome of assembly is a community in statistical equilibrium. In one class of such theories, it is assumed that whatever mechanisms are at play, they are only relevant in determining the values of ecological state variables, and then if the system is allowed to come to equilibrium its properties will be predicted by maximizing information entropy relative to the constraints of the state variables. One example is the maximum entropy theory of ecology (METE), one model realization of which assumes that the area (A) of an ecosystem, the total number of species (S) in some taxonomic group, the total number of individuals in those species (N), and the total metabolic rate of those individuals (E), capture all necessary information to characterize a community because that community has reached a statistical equilibrium in which the imprint of specific mechanistic forces has been lost. While this theory finds widespread success in predicting ahistorical patterns of species abundance, size, and spatial distribution \cite{Harte2011-um, White2012-yw, Xiao2015-jv, Harte2009-zq} at single snapshots in time, it fails to match observed patterns in disturbed and rapidly evolving communities \cite{Rominger2015-kb,Harte2011-um}.