1176-92-122 **Anuraag Bukkuri*** (anuraag.bukkuri@moffitt.org) and **Joel S Brown**. *Eco-Evolutionary Dynamics in State-Structured Populations with Applications to Cancer Therapeutic Resistance: Preliminary Report.* Preliminary report.

We introduce a generalization of stage- and age-structured populations called state-structured populations, which are ubiquitous throughout biology from cells entering and exiting various cell states to species in a metapopulation migrating among habitats. Though the mathematical framework for modeling age- and stage-structured populations under density and frequency independence is somewhat well developed, the same cannot be said for state-structured populations. In the context of matrix theory, evolutionary game theory, and the G function framework, we herein develop the mathematics needed to simulate and analyze the ecology and evolution of state-structured populations. For simplicity, we consider the case of two discrete states in the population and focus on difference equation implementations of the relevant matrix population models. We broadly investigate ecological (long-term and transient) and evolutionary dynamics of state-structured populations under density- and frequency-dependence. An expository example of the application of such a framework in biology is provided in the modeling of cell plasticity and therapeutic resistance in cancer due to polyaneuploid cancer cells. (Received January 18, 2022)