1125-92-2354 **Evan Milliken*** (evmilliken@ufl.edu). *Critical population size for multitype branching process approximation.* Preliminary report.

The basic reproduction number,R_0, is a threshold for deterministic epidemic models. When $R_0 < 1$ the disease cannot invade. When $R_0 > 1$ the disease invades and in some cases, persists. Stochastic models are used to capture the dynamics in a random environment. In this setting, $R_0 < 1$ implies the disease goes extinct with probability 1, but $R_0 > 1$ implies only that the probability of extinction is strictly between 0 and 1. In the cases of multiple infectious classes, multitype branching process approximation (MBPA) is used to estimate the probability of extinction of the virus. For MBPA to be accurate, independent transitions and sufficiently large number of susceptible individuals at disease free equilibrium, S_0 are necessary conditions. Two deterministic models of Infectious Salmon Anemia virus infection in a single population are presented with different forces of infection. Equilibria and R_0 are determined and it is shown that $R_0 > 1$ implies the virus persists. Related stochastic models are introduced and probability of extinction is determined via Monte-Carlo simulation and MBPA. The critical number of susceptibles $\bar{S}$ is determined so that MBPA is accurate whenever $S_0 > \bar{S}$. (Received September 20, 2016)