1125-92-194 **T.Mihiri M De Silva*** (mihiri.de-silva@ttu.edu), Department of Mathematics and Statistics, Broadway and Boston, Lubbock, TX 79409, and **Sophia Jang**. *Deterministic and Stochastic Dynamics of Phytoplankton-Zooplankton Interactions with a Toxin Producing Phytoplankton.*

We propose deterministic and stochastic mathematical models of interactions between non-toxic phytoplankton (NTP), toxin producing phytoplankton (TPP), and zooplankton. In these models, mutual interference between zooplankton and avoidance of TPP by zooplankton are considered. The proposed deterministic model supports the Paradox of Enrichment, which states that increasing prey's carrying capacity leads to destabilizing the predator-prey interactions. Our analytical findings, indicate that mutual interference of the zooplankton can stabilize the interactions. Numerical simulations with parameter values taken from existing literature are performed to illustrate complexities of the population interactions and to validate our analytical findings. We then construct parallel models of continuous-time Markov Chain and Itô stochastic differential equations to study the effects of randomness. We apply the Euler-Maruyama numerical method to approximate the Itô stochastic differential model and to investigate probability distributions of the plankton populations. It is concluded that randomness of the environment can change the Paradox of Enrichment and the effect of mutual interference. The plankton populations may be more likely to go extinct in the stochastic environment. (Received August 11, 2016)