UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

FUNDAMENTAL STUDY OF ADOMIAN DECOMPOSITION METHOD IN SOLVING PREY-PREDATOR MODEL

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Report submitted in partial fulfillment of the requirement
for the degree of
Bachelor of Science (Hons.) Mathematics
Center of Mathematics Studies
Faculty of Computer and Mathematical Sciences

JULY 2016

ACKNOWLEDGEMENTS

بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

First of all, we want to thank Allah s.w.t for giving us this golden opportunity as a good physical and mental condition to finish this project.

There are many people who help us in finishing this project but we want to express most of the gratitude to Miss Farahanie binti Mohd Fauzi, for all of her guidance, encouragement, support and mostly her patience in this project as well as for her advice and assistance in ensuring the finishing of our project.

We also would like to express gratitude to our classmates for their support, cooperation ,and valuable information.

Last but not least, we want to express gratitude to all of our comrades for good cooperation and good teamwork. Thank you for all valuable idea and because of our high level teamwork we able to finish this project perfectly.

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ABSTRACT

Lotka-volterra model which is in the form of system of ordinary differential equations is the most famous mathematical model used in simulating the relation between a prey and a predator. The trends of solutions of the model differs as the value of parameters used in the equations differs, hence may effect the accuracy of the model's solution. Among identified parameters involved in Lotka-Volterra model are death rate, eaten rate and born rate. The purpose of this project is to study two-species interactions using Lotka-Volterra equations. Adomian Decomposition Method is employed to approximate solutions of the system of nonlinear Volterra differential equations governing on the problem. Hence the best parameters used in simulating the prey-predator relation are identified and selected. All in all, the above mentioned results are important to be observed and studied in order to understand the ecological interactions between prey and predator populations.

1 INTRODUCTION

"When a lion doesn't get its prey, it remains hungry.

When the prey saves himself, he has not won, but has saved his life."

Kotak (2015)

The above simple quote on prey and predator interaction brings out few question on the interaction that needs to be ponder upon. Do the prey always saved his life from being caught by its predator? Does the lion stop hunting its prey when he does not get the prey? These two questions bring us to learn more about prey and predator interaction. First of all, we need to know what is prey and predator. Prey is the organism that being attacked or eaten by the predator while predator is an organism that eat another organism. This natural phenomenon occurs around us every day.

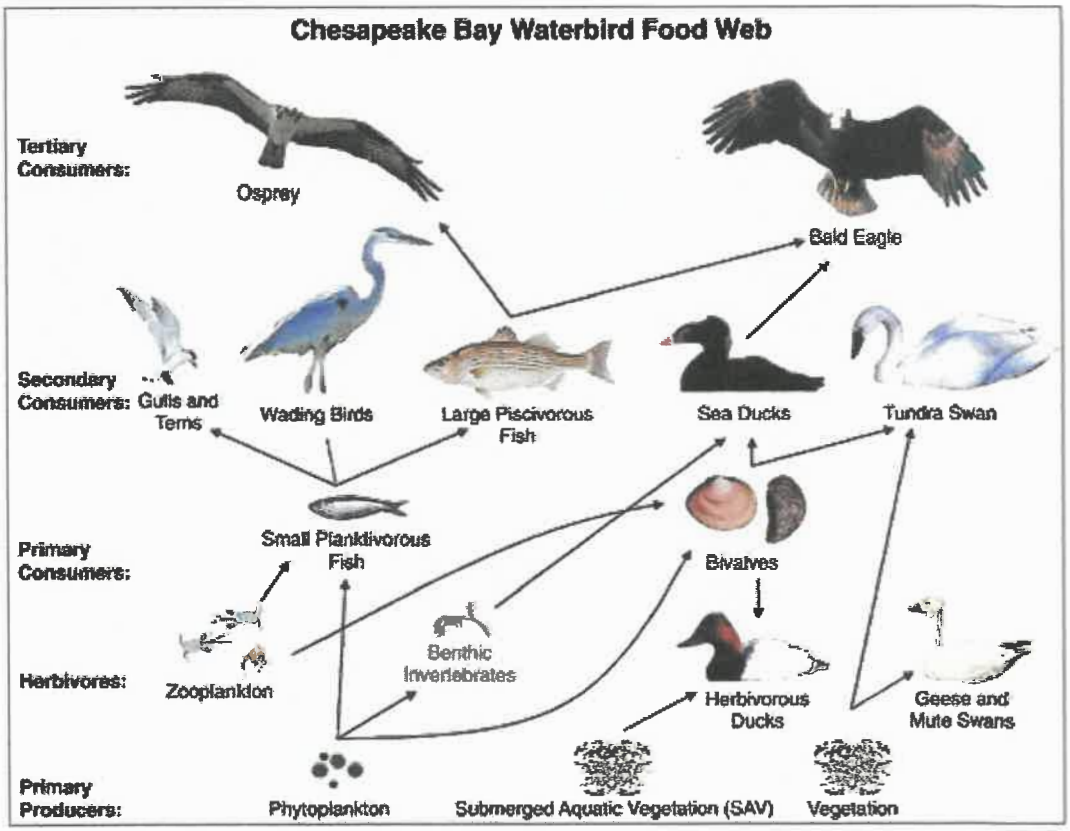

Figure 1.1: Chesapeake Bay Waterbird Food Web.