UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

Approximating The Length of California Halibut (*Paralichthys Californicus*) using Euler's and Second Order Runge-Kutta Methods

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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TABLE OF CONTENTS

ABSTRACT

According to California Department of Fish and Wildlife, said California halibut is one of the most important commercial and recreational species in southern California. California halibut are the target of a strong statewide commercial fishery. There are three principle gear types used in the fishery are hook-and-line, trawl, and set gill net. Once landed, halibut are sold as fresh fillets or in live conditions to the restaurants or fish markets. Most halibut are consumed domestically with very few going to export. Annual commercial landing of halibut have averaged over 1 million pound over the past 8 years. Thus, this study embarks on considered the equation of population dynamics and interacting growth of California halibut. There are (3) main objectives for this study. Firstly, the study is conducted to estimate the length of California halibut in the age of range 1 to 10 years. Secondly is to comparing real data with Euler's method and Second Order Runge-Kutta method (RK2). Finally, the study is also done to determine the "suitable" approach method by analyze and comparing error that represented by each method with real data. The objective function of Euler's method and Second Order Runge-Kutta method (RK2) for measure California halibut is to know the approximating the increases growth length according time. The real data are obtained from University of California. Based on result found, the growth length of fish increases according to time. Study discovered that Second Order Runge-Kutta method (RK2) is the suitable approach for determining the growth length of the fish. The method and findings of the solution are hoped to be able to provide useful information to recreational and commercialize California halibut fishery.

1. INTRODUCTION

1.1 Introduction

The California halibut which is known as Paralichthys Californicus, is a popular and commercial species in southern and central California and the average for annual commercial landings of halibut is over 1 million pounds. It is also known as two flatfish in the genus Hippoglossus from the family of right-eye flounders. There are some places called them as halibut and some places called them as flatfish.

'Halibut' derived from the word haly (holy) and butte (flat fish), for its popularity on Catholic holy days and it is also lives in the deepest part of the seawater and are strongly regarded as a food fish. There two species in the genus Hippoglossus which are Atlantic Halibut (Hippoglossus hippoglossus that lives in the North Atlantic and the other species is Pacific Halibut (Hippoglossus Stenolepis) that lives in the North Pacific.

Scientific Classification

Kingdom: Animalia
Phylum: Chordata
Class: Actinopterygii
Order: Pleuronectiformes
Family: Bothidae
Genus: Paralichthys
Species: Californicus

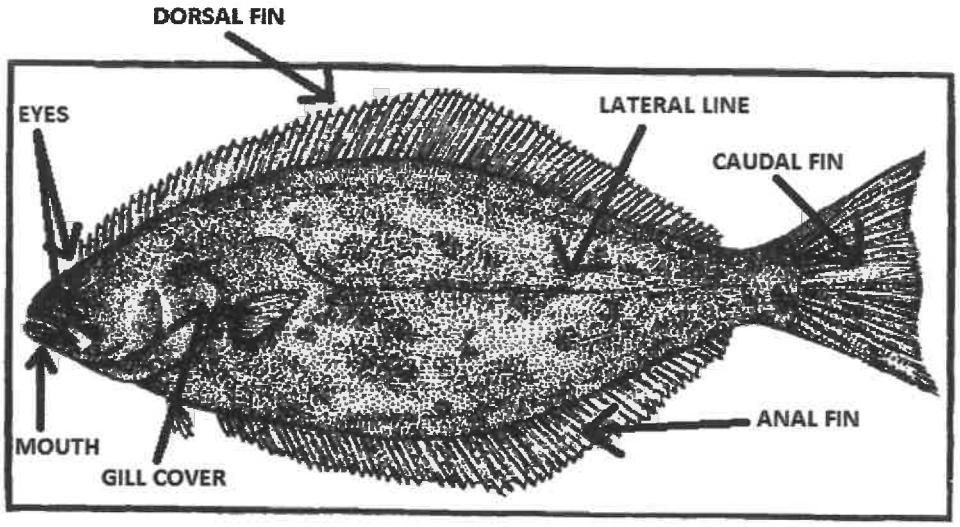

Figure 1: Physical of California Halibut

There are so many physical characteristic of the halibut. One of them is their upward-facing side tend to be a mottled dark brown and white on their downside. Usually halibut