BIOLOGICAL PARAMETERS AND POPULATION DYNAMICS OF THE BLUELINE SNAPPER, *Lutjanus coeruleolineatus* (RUPPELL, 1838) FROM DHOFAR GOVERNORATE, SULTANATE OF OMAN

DAWOOD SULAIMAN AL-MAMARI

Thesis Submitted in Fulfillment of the Requirement for the Degree of Master of Science in the School of Fisheries and Aquaculture Sciences Universiti Malaysi Terengganu

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DEDICATION

“I humbly thank Allah Almighty

Who provided me with health, strength and energy

Gave me success

Glory be to Him alone”

“I would like to dedicate this thesis to my family

Father, Mother, Brothers, Sisters, Wife and My Children”

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of the requirement for the degree of Master of Science

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The Blueline snapper *Lutjanus coeruleolineatus* is a significant commercial species harvested in the traditional fishery in the Sultanate of Oman. To date the biological characteristics of Blue line snapper have not been studied. Hence the current study is conducted to examine this fish such as length-weight relationships, condition factor, sex ratio, gonadosomatic index (GSI), size and age at 50% maturity, estimation of growth parameters by analysis otolith structure and the asymmetry characteristics by using otolith dimension. A random collection of the species (449 males and 529 females) were sampled monthly from the Dhofar Governorate off the coast of the Arabian Sea from February 2015 to March 2016. Females had mean TL 29.10 ± 0.21 cm larger than mean TL of male (mean TL= 27.5 ± 0.16 cm). Mean TW of females were 424.10 ± 10.90 g which were significantly heavier than the mean TW of males (mean TW= 336.1 ± 6.6 g). The length- weight relationships for male, female and combined sex were significantly correlated ($P<0.05$) and b values

estimation for male and female were 2.9 and 3.1 respectively. The average monthly condition factor (Kn) values showed quite similar pattern for both sexes with a slightly higher values for females. Both sexes recorded peak (Kn) value in May, August, and January. The male-female sex ratio analysis was 1:1.17 ($P < 0.05$) with dominate of females in May, July and October. The GSI data indicate that *L. coeruleolineatus* has prolonged breeding season from August to January with two peaks occurring in October and January. The first maturity was 28.1 TL cm for males and 29.7 TL cm for females. A total number of 296 sectioned otoliths were analysed and growth was estimated from non-seasonal growth by using von Bertalanffy method. Age structure is between 1 and 14 years for males while females age range was 1 to 18 years. Growth rate (K) was 0.24 y^{-1} and 0.15 y^{-1} for males and females respectively. The hypothetical length of female ($L\infty$= 42.82) was relatively higher than that of male ($L\infty$=37.1). The natural mortality (M) was 0.283, total mortality (Z) was 0.372, fishing mortality was 0.089 and exploitation rate (E) was estimated as 0.239. Ninety five pair of otoliths were investigated to determine otolith morphometric and otolith asymmetry. The dimensions of otolith for fish had strong growth in proportion to length of the fish. The level of asymmetry was high for the otolith length than otolith width. The management of of Blueline snapper, *L. coeruleolineatus* fisheries will be more efficiently if the spawning seasons, gears selectivity are monitored and investigate the biological parameters of Blueline snapper from north area of Oman (Sea of Oman) and compare it with current study to see the variations of growth between two areas.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu

sebagai memenuhi keperluan untuk ijazah Sarjana Sains

PARAMETER BIOLOGI DAN DINAMIK POPULASI JENAHAK GARIS BIRU, *Lutjanus coeruleolineatus* (RUPPELL, 1838)Dari DHOFAR GOVERNORATE, KESULTANAN OMAN

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Jenahak garis biru *Lutjanus coeruleolineatus* adalah spesies komersial penting dituai dalam industri perikanan tradisional di Kesultanan Oman. Sehingga kini ciri-ciri biologi Jenahak garis biru belum dikaji. Oleh itu kajian semasa dijalankan untuk mengkaji ikan, hubungan panjang-berat badan, faktor kondisi, nisbah jantina, indek gonadosomatik (GSI), saiz dan umur pada 50% kematangan, anggaran parameter tumbesaran dengan analisa struktur otolit dan ciri-ciri asimetri dengan menggunakan dimensi otolit. Satu penyampelan spesies secara rawak (449 jantan dan 529 betina) telah disampel setiap bulan dari Dhofar Governorate di luar pantai Laut Arab dari Februari 2015 hingga Mac 2016. Betina mempunyai purata TL 29.10 ± 0.21 cm lebih besar daripada purata TL jantan (purata TL = 27.5 ± 0.16 cm). Purata TW betina adalah 424,10 ± 10.90 g yang lebih berat daripada purata TW jantan (purata TW = 336,1 ± 6.6 g). Perhubungan berat-panjang bagi jantan, betina dan gabungan jantina berkait secara signifikan ($P < 0.05$) dan nilai anggaran b bagi jantan dan

betina masing-masing adalah 2.9 dan 3.1. Nilai purata Faktor kondisi bulanan (Kn) menunjukkan corak agak sama bagi kedua-dua jantina dengan nilai yang sedikit tinggi bagi betina. Kedua-dua jantina mencatatkan nilai puncak (Kn) pada bulan Mei, Ogos dan Januari. Analisa nisbah jantina jantan-betina adalah 1: 1.17 ($P < 0.05$) dengan betina mendominasi pada bulan Mei, Julai dan Oktober. Data GSI menunjukkan bahawa *L. coeruleolineatus* mempunyai musim pembiakan berpanjangan dari Ogos hingga Januari dengan dua puncak berlaku pada bulan Oktober dan Januari. Tempoh mula matang adalah 28.1 TL cm bagi jantan dan 29.7 TL cm bagi betina. Sebanyak 296 keratan otolit dianalisa dan tumbesaran dianggarkan daripada tumbesaran tidak bermusim dengan menggunakan kaedah von Bertalanffy. Struktur umur adalah antara 1 dan 14 tahun bagi jantan manakala julat umur betina adalah 1 hingga 18 tahun. Kadar tumbesaran (K) adalah 0.24 y-1 dan 0.15 y-1 masing-masing untuk jantan dan betina. Anggaran panjang infiniti bagi betina ($L\infty = 42,82$) adalah lebih tinggi berbanding dengan jantan ($L\infty = 37.1$). Kematian semula jadi (M) adalah 0.283, jumlah kematian (Z) adalah 0.372, kematian tangkapan adalah 0.089 dan kadar eksploitasi (E) dianggarkan 0.239. Sembilan puluh lima pasang otolit telah dikaji untuk menentukan morfometrik dan asimetri otolit. Dimensi otolit ikan mempunyai pertumbuhan kukuh berkadaran dengan panjang ikan. Tahap asimetri adalah tinggi untuk panjang otolit daripada lebar otolit. Pengurusan perikanan jenahak garis biru, *L. coeruleolineatus* akan menjadi lebih cekap pemantauan musim bertelur, dan selektiviti alat tangkapan serta mengkaji parameter biologi jenahak garis biru dari kawasan utara Oman (Sea of Oman) dan membandingkannya dengan kajian semasa untuk melihat variasi tumbesaran antara dua kawasan.