

FISHERY AND POPULATION DYNAMICS
OF THE PINK PRAWN, *Metapenaeus intermedius* IN
EAST JOHOR WATERS, PENINSULAR MALAYSIA

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KOLEJ UNIVERSITI TERENGGANU
UNIVERSITI PUTRA MALAYSIA

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**Thesis Submitted in Fulfilment of the Requirements for the
Degree of Master of Science in the Faculty of Science and Technology
Kolej Universiti Terengganu
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DEDICATION

This work is dedicated to my parents,
my children, Mohamad Azfar Zulkifli
and Syaza Adriana and my wife,
Fauziah Osman

Abstract of thesis submitted to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Master of Science.

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Chairman : Assoc. Prof. Dr. Hj. Mohd. Zaki Mohd Said

Faculty : Applied Science and Technology

The aim of this study is to investigate the fishery and population dynamics of the pink prawn, *Metapenaeus intermedius* in East Johor waters, Peninsular Malaysia.

Monthly sampling of the trawl catches was conducted at Endau fish landing center, East Johor for 15 months. Prawn samples were collected during the off-loading of the catches from the trawlers of more than 40 gross tonnage (GRT) operated in Zone C. The catches of prawns were also observed from various sized trawlers to verify the composition of *M. intermedius*. The secondary data i.e. catch-effort were also collected from the Department of Fishery (DOF) in Mersing.

Results from these observations showed that *M. intermedius* comprised between 44-100% in the mixed pink prawns caught by trawlers. No catches of *M. intermedius* were found from the small trawlers less than 10 GRT operated in Zone A (during monsoon season) and Zone B. The *M. intermedius* comprised between 55-100% in the mixed pink prawn catches of trawlers more than 10 GRT operated in Zone A (during monsoon season) and Zone B. The composition of *M. intermedius* in the catches of trawlers of more than 25 GRT operated in Zone B ranged between 44-75%. Trawlers of more than 40 GRT operated in Zone C caught between 50-70% of *M. intermedius* from the mixed pink prawn. However, the composition of this prawn varied within a small range between 40-50% in the catches of large trawlers of more than 70 GRT operated in Zone C2.

The high catch season of *M. intermedius* occurred from August to October i.e. during the late period of the southwest monsoon and also from November to December i.e. during the early period of the northeast monsoon. Catches were mainly contributed by trawlers of more than 25 GRT operated in Zone B and trawlers of more than 40 GRT operated in Zone C. The muddy bottom in areas between 12 and 30 nautical miles (Zone C) with depths ranging between 20 and 40 meters were found to be rich fishing grounds.

Maximum Sustainable Yield (MSY) for *M. intermedius* estimated from Schaefer production model was between 70-100 tonnes giving the optimum annual standardized effort around 1,601 units which equals to 292,722 fishing hours. The

results showed that the current exploitation of this species is already at the MSY level. Analysis from the overall penaeid prawn landings however indicates that the status of prawn resources in this area is still in the healthy state where the annual landings and annual standardized effort is below the MSY level of 1,800-2,000 tonnes.

Estimates of the growth parameters derived from the two different methods were $K = 1.10$ to 1.12 year^{-1} , $L_{\infty} = 4.89$ to 5.00 cm (carapace length) for females and $K = 0.92$ to 0.94 year^{-1} , $L_{\infty} = 4.35$ to 4.39 cm (carapace length) for males. Estimates of total mortality using the two different growth parameters were $Z = 3.51$ to 4.00 for females and 3.99 to 5.05 for males. Based on the values of mortality, the exploitation rates were found to be in the range of 0.11 to 0.23 for females and 0.29 to 0.43 for males and have a mean value of 0.27 for both sexes.

Taking $E_{0.1}$ as a management criteria for *M. intermedius* fishery in East Johor waters, relative yield per recruit were estimated to reach the optimum when $E=1$ for both sexes. These results indicated that the exploitation rates of this species are still under the optimum level.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains.

**PERIKANAN DAN DINAMIK POPULASI
UDANG EKOR BIRU, *Metapenaeus intermedius* DI PERAIRAN
JOHOR TIMUR SEMENANJUNG MALAYSIA**

Oleh

IBRAHIM JOHARI

April 2000

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Beberapa aspek perikanan dan dinamik populasi bagi udang ekor biru, *M. intermedius* telah dikaji di Perairan Johor Timur, Semenanjung Malaysia.

Persampelan bulanan di pusat pendaratan ikan utama di Endau, Johor Timur dijalankan selama 15 bulan. Sampel diambil semasa pemunggahan tangkapan dari bot pukat tunda bermuatan melebihi 40 GRT yang beroperasi di zon perikanan C. Permerhatian hasil tangkapan dari pelbagai saiz pukat tunda juga dijalankan bagi menentukan komposisi spesies udang *M. intermedius* dalam kumpulan udang ekor biru. Data sekunder iaitu tangkapan dan unit usaha juga di perolehi dari Jabatan Perikanan Mersing.

Hasil pemerhatian menunjukkan bahawa komposisi udang *M. intermedius* adalah diantara 44-100% dalam kumpulan udang ekor biru. Tiada tangkapan udang *M. intermedius* diperolehi dari bot pukat tunda yang bermuatan kurang dari 10 GRT yang beroperasi di zon perikanan A (semasa musim tengkujuh) dan zon perikanan B. Udang *M. intermedius* merangkumi 55-100% dalam kumpulan udang ekor biru yang dihasilkan oleh bot pukat tunda bermuatan lebih daripada 10 GRT yang beroperasi di zon perikanan A (semasa musim tengkujuh) dan perikanan zon B. Komposisi udang *M. intermedius* berjulat antara 44-75% dalam tangkapan bot pukat tunda yang bermuatan lebih daripada 25 GRT yang beroperasi di zon perikanan B. Bot pukat tunda yang bermuatan lebih daripada 40 GRT yang beroperasi di zon perikanan C pula menangkap udang *M. intermedius* antara 50-70% daripada kumpulan udang ekor biru. Walau bagaimanapun komposisi udang ini hanya berjulat antara 40-50% dalam tangkapan pukat tunda bermuatan lebih daripada 70 GRT yang beroperasi di zon perikanan C2.

Tangkapan bulanan yang tinggi berlaku dari bulan Ogos hingga Oktober iaitu di penghujung monsun barat daya dan juga dari bulan November hingga Disember iaitu di awal monsun timur laut. Sebahagian besar tangkapan disumbangkan oleh bot pukat tunda yang bermuatan lebih dari 25 GRT yang beroperasi di zon perikanan B dan bot pukat tunda yang bermuatan lebih dari 40 GRT yang beroperasi di zon perikanan C. Kawasan tangkapan yang baik adalah di dasar berlumpur dari 12 hingga 30 batu nautika (zon perikanan C) dengan kedalaman 20 dan 40 meter.

Anggaran "Maximum Sustainable Yield" (MSY) bagi udang *M. intermedius* yang diperolehi menerusi model pengeluaran Schaefer sebanyak 70-100 ton metrik dan jumlah unit usaha optimum kira-kira 1,601 unit yang bersamaan 292,722 jam penundaan. Keputusan ini menunjukkan tahap semasa eksploitasi bagi spesies ini berada di paras MSY. Walau bagaimana pun status keseluruhan sumber udang penaeid di kawasan ini adalah baik di mana pendaratan tahunan dan jumlah unit usaha masih di bawah paras MSY, 1,800-2,000 tan metrik.

Anggaran parameter tumbesaran yang dikira berdasarkan dua kaedah yang berbeza adalah $K = 1.10$ hingga 1.12 per tahun, $L_{\infty} = 4.89$ hingga 5.00 cm (panjang karapas) bagi udang betina dan $K = 0.92$ hingga 0.94 per tahun, $L_{\infty} = 4.35$ hingga 4.39 cm (panjang karapas) bagi udang jantan. Anggaran jumlah kematian dengan menggunakan dua input parameter tumbesaran tersebut adalah $Z = 3.51$ hingga 4.00 bagi udang betina dan 3.99 hingga 5.05 bagi jantan. Berdasarkan kepada nilai kematian, didapati kadar eksploitasi adalah di dalam julat 0.11 hingga 0.23 bagi udang betina dan 0.29 hingga 0.43 bagi udang jantan dan memberikan purata nilai kematian 0.27 bagi kedua-dua jantina.

Dengan menggunakan $E_{0.1}$ sebagai kriteria pengurusan udang *M. intermedius* di perairan Johor timur, hasil relatif per rekrutmen dianggarkan mencapai paras optimum bila $E=1$. Nilai ini menunjukkan kadar eksploitasi bagi spesies ini masih di bawah paras optimum.