

**Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfilment of the requirements for the degree of Master of Science**

**NESTING OF *Carcinoscorpius rotundicauda* IN BALOK RIVER, PAHANG IN RELATION TO CHANGES OF SOME ENVIRONMENTAL FACTORS**

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The mangrove horseshoe crab, *Carcinoscorpius rotundicauda* (Latreille, 1802) has received less scientific attention than the other horseshoe crab species because its distribution is restricted and researchers would experience accessibility constraints in the muddy mangrove environment. With limited data, the population status of *C. rotundicauda* is still remaining 'Data Deficient' within the IUCN Red List database. The present study (January–December 2016) was aimed at identifying *C. rotundicauda* spawning activity in relation to edaphic and hydrologic conditions (during monsoonal transitions) at Balok River (State: Pahang), East coast of Peninsular Malaysia. Three sites (S1–S3) in 200–1000 m distances from the Balok River mouth, dominated by *Avicennia* and *Rhizophora* spp., were found hospitable to the spawning activity of *C. rotundicauda*. Monthly sampling for collecting the adult specimens was conducted with gill nets (200 m length x 2 m height with a mesh size of 11.43 cm).

Surface sediment was removed gently by using a hand scoop to count the number of eggs in every nest exhumed. A total number of 56 nests with 2880 eggs were noticed for the dry Southwest monsoon (May–September) while 31 nests and 1811 eggs were found at Balok River for the wet Northeast monsoon (October–February). Irrespective of the seasonal salinity variations, a strong correlation ( $p = 0.551$ ) was achieved between *C. rotundicauda* nesting activity and sediment sorting/ nest depth. Overall, more than 60 % of sexually matured *C. rotundicauda* were found during the dry season (n=229) than to the wet season (n=26) in Balok River. On the other hand, eggs of *C. rotundicauda* were abundant in the nests at 1.9–3.5 cm depths and these nests were dominated by medium to fine sand. The present study on *C. rotundicauda* nesting activity at Balok River serves as a baseline data for enacting possible wildlife conservation activities and implement strict regulations after physical infrastructure developments along the Malaysian coastlines.

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**PENYARANGAN *Carcinoscorpius rotundicauda* DI SUNGAI BALOK,  
PAHANG DAN HUBUNGANNYA DENGAN BEBERAPA FAKTOR  
PERSEKITARAN**

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Belangkas bakau atau dikenali sebagai *Carcinoscorpius rotundicauda* (Latreille, 1802) kurang mendapat perhatian saintifik berbanding spesies belangkas yang lain kerana kewujudannya agak terbatas dan para penyelidik mengalami kesukaran untuk memasuki habitat bakau berlumpur belangkas ini. Kekurangan maklumat berkenaan spesies belangkas ini telah mengekalkan status populasinya di habitat liar sebagai 'Kekurangan Data' di dalam Senarai Merah IUCN. Kajian ini (Januari–Disember 2016) dijalankan bertujuan untuk mengkaji aktiviti pembiakan *C. rotundicauda* dan mengenal pasti kesan edafik dan hidrologi (ketika musim peralihan monsoon) di Sungai Balok (Pahang), Pantai Timur Semenanjung Malaysia. Tiga lokasi pembiakan belangkas (S1–S3) dengan jarak 200–1000 m dari muara Sungai Balok, dan didominasi oleh pokok bakau dari spesies *Avicennia* dan *Rhizophora* spp. didapati menyokong aktiviti pembiakan *C. rotundicauda*. Aktiviti persampelan secara bulanan menggunakan pukot tangsi (200 m panjang x 2 m tinggi dengan ukuran pukot

11.43 cm) didapati berkesan untuk menangkap belangkas dewasa. Permukaan pasir telah dikorek secara berhati-hati menggunakan senduk sebelum bilangan telur direkodkan dari setiap sarang yang digali. Sejumlah 56 sarang dengan 2880 biji telur telah digali ketika musim kering Monsun Barat Daya (Mei–September) manakala 31 sarang dan 1811 biji telur telah dijumpai di Sungai Balok ketika musim lembab Monsun Timur Laut (Oktober–Februari). Kemasinan tidak mempengaruhi aktiviti persarangan belangkas tetapi korelasi yang kuat ( $p = 0.551$ ) telah dicapai untuk taburan pasir dan kedalaman sarang. Secara menyeluruh, lebih daripada 60 % belangkas matang telah diperolehi ketika musim kering ( $n=229$ ) berbanding ketika cuaca lembab ( $n=26$ ) di Sungai Balok. Selain itu, belangkas betina *C. rotundicauda* didapati bertelur pada kedalaman 1.9–3.5 cm di dalam pasir yang bersaiz sederhana dan halus. Kajian berkenaan aktiviti pembiakan *C. rotundicauda* di Sungai Balok ini akan berfungsi sebagai data asas yang boleh membantu pihak berkuasa untuk menguatkuasakan peraturan ketat mengenai pembangunan infrastruktur fizikal di sepanjang pesisiran pantai Malaysia.