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MASTER OF SCIENCE

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MORPHOLOGY AND FEEDING HABITS OF FRESHWATER MUSSEL, *Sinanodonta (Anodonta) woodiana* (LEA, 1834) ON PHYSICO-CHEMICAL WATER CHARACTERISTIC IN KENYIR LAKE

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Thesis Submitted in Fulfillment of the Requirement for the Degree of Master of Science in the Institute of Tropical Aquaculture
Universiti Malaysia Terengganu

MAC 2016

Dedication

To my husband, Muhammad Jaafar Bin Abdullah,
my sons, Ahmad Jailani & Syariff Muhammad
my parents and family in-law;
Ochi Mohri & Delima Taim,
Abdullah Sulaiman & Kutong Othman,
thank you for your love, understanding and support.

Upon the day when you see the faithful,
men and women, their light running before them,
and on their right hands. "Good news for you today!
Gardens through which rivers flow, therein to dwell
forever! This is indeed the mighty triumph."
(Qur'an, 57:12)

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

MORPHOLOGY AND FEEDING HABITS OF FRESHWATER MUSSEL, *Sinanodonta (Anodonta) woodiana* (LEA, 1834) ON PHYSICO-CHEMICAL OF WATER CHARACTERISTIC IN KENYIR LAKE

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Institute : **Institute of Tropical Aquaculture**

Kenyir Lake is the largest man-made lake in South-East Asia with rich abundance of flora and fauna. *Sinanodonta (Anodonta) woodiana* is the largest (size) representative of the family Unionidae originating from South-Eastern Russia to Malaysia. This study was designed to confirm the presence of this freshwater mussel species in Kenyir Lake, their abundance in relation to substrate type and physiochemical water as well as their feeding habit in the lake. The study was conducted between September 2010 until November 2012. Qualitative survey was conducted at two sampling locations namely Mandak River and Kiang River. The species of mussel collected in these locations were confirmed as *S. woodiana* by their morphological characteristic and molecular examination. Result revealed that the abundance of mussel in the lake ($p \leq 0.05$) was largely substrate dependent and not dependent on the

physico-chemical parameter water ($p \geq 0.05$). Basically, substrate were markedly different between the two sampling location. Substrate observed in the Mandak River included loam, sandy clay, sandy clay loam, silt loam and silt clay loam. Mussel abundance were significantly high in loam (155 pieces of sample) as compared to other substrate. Instead of sandy clay and silt clay loam substrate found in the Kiang River; silt, clay loam and clay were also present. However, the most abundant freshwater mussel was found in the silty clay loam substrate (85 pieces of sample). Abundance pattern shows a continuous reduction from 2010 to 2012 due to changes in the substrate of both locations over time. Gut content assessments of *S. woodiana* also revealed a total of 13 phytoplankton species from 41 identified phytoplankton in water samples from the study locations. The observed feeding preference in terms of hierarchy was in the family order of Chlorophyta>Phrrophyta>Chrysophyta. Therefore, it was concluded that *S. woodiana* was present in the Kenyir Lake and its abundance was significantly affected by the substrate type and preference phytoplankton species as their feed. The data generated from this study can serve as a guide for the management of *S. woodiana* in this lake.

Abstrak tesis dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk ijazah Master Sains

MORFOLOGI DAN TABIAT PEMAKANAN KEPAH AIR TAWAR, *Sinanodonta (Anodonta) woodiana* (LEA, 1834) KE ATAS CIRI-CIRI FIZIKAL-KIMIA AIR DI TASIK KENYIR

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Tasik Kenyir adalah Tasik buatan manusia terbesar di Asia Tenggara yang kaya dengan flora dan fauna. *Sinanodonta (Anodonta) woodiana* mewakili saiz terbesar di dalam keluarga Unionidae yang berasal dari Selatan- Timur Rusia ke Malaysia. Kajian ini telah direka untuk mengesahkan kehadiran spesies kepah air tawar di Tasik Kenyir, hubung kait kehadirannya terhadap jenis substrat dan fizikal kimia air serta tabiat pemakanan mereka di tasik. Kajian telah dijalankan antara September 2010 sehingga November 2012. Kajian kualitatif telah dijalankan di dua lokasi persampelan iaitu Sg. Mandak dan Sg. Kiang. Spesies kepah yang dikumpul di lokasi ini telah disahkan sebagai *S. woodiana* melalui ciri -ciri morfologi dan kaedah molekul. Keputusan juga menunjukkan bahawa kelimpahan kepah di tasik ($p \leq 0.05$) adalah sebahagian besarnya bergantung kepada substrat dan tidak bersandar terhadap fizikal kimia air ($p \geq 0.05$). Pada dasarnya, substrat adalah berbeza antara kedua-dua

lokasi persampelan. Substrat diperhatikan di Sungai Mandak termasuk lempung, liat berpasir, lempung liat berpasir, lempung kelodak dan lempung liat kelodak. Kelimpahan kepah didapati paling tinggi dengan ketara di dalam lempung (155 ekor sampel) berbanding substrat lain. Selain daripada itu substrat liat berpasir dan lempung liat kelodak ditemui di Sungai Kiang; kelodak, lempung berliat dan liat turut hadir. Walaubagaimanapun, kelimpahan kepah air tawar adalah tertinggi di dalam substrat lempung liat kelodak (85 ekor sampel). Corak kelimpahan menunjukkan pengurangan berterusan dari 2010 hingga 2012 disebabkan oleh perubahan dalam substrat di kedua –dua lokasi dari semasa ke semasa. Analisis penilaian kandungan usus *S. woodiana* juga mendedahkan sejumlah 13 spesies fitoplankton daripada 41 fitoplankton yang dikenalpasti dalam sampel air dari lokasi kajian. Pemerhatian pilihan pemakanan dari segi hierarki adalah mengikut famili Chlorophyta > Phrrophyta > Chrysophyta. Oleh itu, boleh disimpulkan bahawa kelimpahan ketara *S. woodiana* hadir di Tasik Kenyir adalah dipengaruhi oleh jenis substrat dan fitoplankton terpilih sebagai makanan utama. Data yang diperolehi daripada kajian ini boleh dijadikan panduan bagi pengurusan *S. woodiana* di tasik ini.