

# The Biology and Aquaculture Potential of *Cherax quadricarinatus*

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**THE BIOLOGY AND AQUACULTURE POTENTIAL OF *CHERAX*  
*QUADRICARINATUS***

by

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THIS DOCUMENT WAS SUBMITTED TO THE RESERVE BANK OF AUSTRALIA  
RURAL CREDITS DEVELOPMENT FUND AS A FINAL REPORT FOR THE PROJECT  
"The Assessment of *Cherax quadricarinatus* as a Candidate for Aquaculture". Project No.  
QDPI/8860.

## ACKNOWLEDGEMENTS

I thank Chris Barlow in particular for initiating this project and for his enthusiastic support throughout. The Fisheries staff of the Walkamin Research Station have all contributed to the successful completion of this research, and I express my gratitude to them. Les Rodgers, Dave Bull, Paul Clayton and Peter Graham deserve special thanks for their assistance. I am grateful to the other staff of Walkamin Research Station who assisted, particularly with the Field Days.

The patient assistance provided by the Walkamin Research Station secretary, Diane McIntyre, was always appreciated.

Special thanks are due to Sue Poole and her team for supervision of post-harvest research and to Charles Hausman for crayfish illustrations.

Unsung heroes of all research projects are our librarians. I express my sincere thanks to Donna Holmes and Zena Seliga for their patience and faithful support.

Continued support and encouragement from the Tropical Freshwater Crayfish Farmers Association and the crayfish farming Industry in general is gratefully acknowledged.

My sincere appreciation goes also to Sharon for her loyal support and counsel always.

This project was jointly funded by the Commonwealth Reserve Bank Rural Credits Development Fund and The Queensland Department of Primary Industry's Fisheries Branch.

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# 1 GENERAL INTRODUCTION

Aquaculture has been touted as the 'sunrise' industry of Queensland despite the modest success achieved to date. There has been considerable interest and some development in the farming of prawns and the prized barramundi. More recently much attention has been focused on freshwater crayfish.

Despite the lack of significant development of freshwater crayfish farming elsewhere in Australia, in 1980 a group of enterprising farmers from south-east Queensland introduced the Western Australian marron (*Cherax tenuimanus*) which they surmised would perform well under the warmer and more equable Queensland climate. Some success and expansion of the industry was achieved until the particularly warm summer of 1986, when the bulk of the marron died. Even prior to this natural disaster, some farmers were looking for alternative species, better suited to the sub-tropics. A relatively unknown crayfish from north Queensland, *Cherax quadricarinatus* entered the scene and commercial trials in ex-marron ponds began. It was soon evident that this species had a substantially greater potential.

*C. quadricarinatus* along with *C. tenuimanus* (marron), *C. destructor* (yabbie) and approximately 10 other *Cherax* species, belong to the family Parastacidae, a group of freshwater crayfish entirely restricted to the southern hemisphere (Chapt.2). *C. quadricarinatus* inhabits rivers and streams of Queensland, Northern Territory and New Guinea. Prior to its emergence as an aquaculture candidate, this species had only been considered in taxonomic studies (Riek, 1951, 1959, 1969). Unlike the yabbie and marron, *C. quadricarinatus* did not support any substantial recreational fishery, primarily because of its remote distribution. Nothing was known of its biology or life habits.

Initially, consideration of *C. quadricarinatus*'s aquaculture potential was based on its relatively large size and its familiarity to other aquacultured species. Commercial trials soon indicated more significant potential, and although biological information was generated, it was observational or anecdotal.

In 1987, Mr.C. Barlow of the Queensland Department of Primary Industry's Walkamin Research Station recognised the need for a thorough scientific assessment of this species' aquaculture potential, and submitted an application for Commonwealth Government assistance. This was granted from the Reserve Bank's Rural Credits Development Fund, and research began in 1988.

The objectives of this study were:-

1. to determine water quality, habitat requirements, stocking density and feeding regimes for optimal survival and growth under controlled laboratory conditions.
2. to develop broodstock husbandry techniques and intensive juvenile rearing procedures.
3. to evaluate survival and growth and effective production techniques in ponds, employing optimal conditions defined from experiments.
4. to examine storage, processing and marketing requirements including export potential, seasonal demand, flavour and presentation preferences.

The research was based at the Walkamin Research Station on the Atherton Tableland, some

70km south-west of Cairns in Far North Queensland. Adjacent to the head waters of the Mitchell River, this location was ideal as *C. quadricarinatus* was readily available. Facilities included a laboratory for controlled experimental studies, a hatchery for holding broodstock and induced spawning, a greenhouse containing 30 large tanks for holding crayfish and used also as a nursery, and 6 earthen ponds ranging in size from 0.1 to 0.2 hectares. These facilities enabled trials to be conducted at a semi-commercial level, such that results were realistically applicable to the industry.

Laboratory studies were necessary to conduct closely controlled experiments. Effect of temperature on growth, salinity tolerance and juvenile nutrition and habitat requirements were investigated in the laboratory in replicated aquarium experiments (Chapters 2 through 4).

Conduct of experiments and particularly grow-out trials necessitated large numbers of juvenile crayfish. Due to the limited number of ponds available, the extensive pond-based methods of juvenile production currently employed by the industry were not suitable. In addition, juveniles were required during winter when pond reproduction does not occur. These were the initial stimuli to the investigations of induced spawning and controlled rearing of juvenile *C. quadricarinatus*. However, the processes involved in this production were of equal importance. Techniques of broodstock collection and handling, induced spawning, incubation of eggs and rearing of juveniles were developed from an experimental point of view. This development constitutes the subject of Chapter 5.

Due to the difficulty of simulating pond conditions in tanks, feeding trials were conducted in an experimental facility established in an earthen pond. This facility permitted use of a replicated experimental design under normal pond conditions. A feeding trial was conducted in this facility (Chapt.6).

Production of berried females and juveniles was sufficient to stock three 0.12ha ponds for grow-out trials. The entire process including pond preparation, stocking, water management, feeding, predator control, stock assessment and harvesting is described in Chapter 7.

Aspects of the research involving food technology were planned from Walkamin, but carried out at the Department of Primary Industry's Food Research Laboratories in Brisbane. Ms Sue Poole, an experience seafood scientist, kindly offered to supervise this work. Chapter 8, which covers this research, is based directly on her report.

In the process of conducting the research detailed in chapters 2 through 8, a considerable amount of biological information was generated indirectly. From this, a description of *C. quadricarinatus's* general biology was possible, which is presented in Chapter 9.

A brief summary of key biological attributes which contribute to the aquaculture potential of *C. quadricarinatus* is presented in Chapter 10.