

College of Science & Engineering
College of Public Health, Medical & Veterinary Sciences
Australian Crayfish Hatchery

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Projects: <https://www.jcu.edu.au/tropical-fisheries-and-aquaculture/research/aquaculture-research>

Development of redclaw crayfish intensive breeding techniques for commercial crayling production – Husbandry technologies

The global redclaw crayfish industry has reached a pivotal point in its development. Methods for growing and harvesting redclaw are well established. However, existing methods for stocking ponds have failed to deliver a consistent supply of market-size animals; preventing the industry from reaching its full potential to meet exponentially increasing domestic and international demand. The rate-limiting step is the lack of hatchery-produced craylings for stocking of growout (production) ponds.

Based on a recently developed innovative *in vitro* embryo incubation method, Australian Crayfish Hatchery (ACH) has successfully produced quality post larvae (craylings) for commercial sale, prompting increasing demand both domestically and internationally. However, numbers of fertilised eggs for incubation are insufficient to meet demand, primarily due to suboptimal methods currently used for fertilised egg production. This is a major constraint to industry growth and export potential.

Improvement in reproductive efficiency (fecundity) is dependent on several important factors that include animal nutrition, optimisation of rearing and spawning conditions, as well as understanding the underlying causes of subfertility through techniques that evaluate gamete and embryo quality (Harlioglu and Farhadi 2017). Furthermore, mass mortality of early craylings known as ‘Stage 2 Syndrome’ suggest that incubation conditions and early craylings feeds and feeding need to be improved. Thus to increase crayling production, JCU in collaboration with Australian Crayfish Hatchery, will establish an intensive broodstock spawning facility and develop advanced reproductive technologies to accelerate selective breeding and sperm banking of superior broodstock year round. More specifically we propose to establish optimal husbandry methods for redclaw broodstock and craylings, investigate gamete and embryo quality, as well as develop induced spawning, artificial fertilization and sperm freezing methods.

We seek a dedicated, self-driven and highly motivated student to undertake a PhD project to develop husbandry technologies for redclaw crayfish (*Cherax quadricarinatus*). Research will involve: (i) investigating the links between nutritional composition and quality of embryos and early craylings; and applying the knowledge to improve broodstock nutrition; (ii) identifying underlying causes of “Stage 2 Syndrome”; (iii) developing husbandry technologies to improve early crayling survival and quality.

The project will commence from January 2019 and the prospective candidate will be required to apply for one of JCU’s highly competitive PhD scholarships due 30th September 2018 (<https://www.jcu.edu.au/graduate-research-school/candidates/scholarships>). Applicants should have a 1st class Honours or MSc Research Degree in a related field, demonstrate Band 2 English language proficiency, and have preferably (co)authored at least one scientific publication. Only high calibre applicants will be considered.

Interested individuals should email a curriculum vitae (containing a list of publications, awards & referees), as well as an academic transcript of their highest degree to chaoshu.zeng@jcu.edu.au by Wed 12th Sept 2018

Relevant Publications

- Harlioglu and Farhadi (2017) Factors affecting the reproductive efficiency in crayfish: implications for aquaculture. *Aquaculture Research* **48 (5)**, 1983-1997.
- Noordin, N., Zeng, C., Southgate, P.C. (in press) Progress in diet development for blue swimmer crab, *Portunus pelagicus*, juveniles: effect of dietary phospholipid on survival, development, growth and resistance to osmotic shock. *Aquaculture Nutrition*
- Wu, X., Zeng, C., Southgate, P. (2014) Ontogenetic patterns of growth and lipid composition changes of the blue swimmer crab larvae: insights into larval biology and lipid nutrition. *Marine and Freshwater Research* **65**, 228-243
- Wu, X., Cheng, Y., Sui, L., Zeng, C., Southgate, P., Yang, X. (2007) Effect of dietary supplementation of phospholipids and highly unsaturated fatty acids on reproductive performance and offspring quality of female Chinese mitten crabs, *Eriocheir sinensis*. *Aquaculture*, **273**, 602-613