

College of Public Health, Medical & Veterinary Sciences
College of Science & Engineering
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 – Egg & embryo 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 crayling 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 egg and embryo technologies for redclaw crayfish (*Cherax quadricarinatus*). Research will involve: (i) developing methods to induce egg maturation and release; (ii) developing assays to characterise egg and early embryo quality and applying these to evaluate fertility in broodstock subjected to different husbandry conditions; & (iii) establishing artificial fertilization techniques.

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 damien.paris@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.
- Vazquez, Tropea and Greco (2008) Development of the female reproductive system in the freshwater crayfish *Cherax quadricarinatus* (Decapoda, Parastacidae). *Invertebrate Biology* **127 (4)**, 433-443.
- Rodriguez, Greco, Medesani, Laufer and Fingerman (2002) Effect of methyl farnesoate, alone and in combination with other hormones, on ovarian growth of the red swamp crayfish, *Procambarus clarkii*, during vitellogenesis. *General and Comparative Endocrinology* **125**, 34-40.