

Project No.: 100008 - 4

## CONSERVATION OF IMPERILED CRAYFISH—EUASTACUS DHARAWALUS (DECAPODA: PARASTACIDAE), FROM THE SOUTHERN HIGHLANDS OF NEW SOUTH WALES, AUSTRALIA

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### Research Brief

#### Background

The Australian Crayfish Project has been finding and identifying freshwater crayfish species from across Australia. As part of this project sampling of freshwater crayfish was conducted around the Fitzroy Falls region of NSW. Within this aquatic ecosystem a rare and unique species of freshwater crayfish occurs. This species, *Euastacus dharawalus* is only found in this aquatic system above Fitzroy Falls. The Falls are at the northern end of Morton National Park and are formed where Yarrunga Creek pours 80 m over the escarpment. These Falls have acted as a barrier to the more aggressive and dominant crayfish species that live below the falls (e.g. *E. yanga*) and *E. dharawalus* survives as a remnant population restricted only to the small, highland section of stream above the falls.

Unfortunately, an exotic species of crayfish (*Cherax destructor*) has become established at the site (Coughran et al. 2009). This species is a predatory, aggressive, highly fecund and fast growing species, biological traits that equip it to rapidly spread throughout this aquatic system. This species poses an imminent and growing threat to the survival of *E. dharawalus*, a much slower growing species with a comparatively poor reproductive biology. The problem may be compounded by the introduction of other recreational fishing species (i.e. Trout, Australian Bass and Carp) plus the growing recreational fishing effort for crayfish centered around the reservoir.

Due to these and other factors, a recent assessment identified *E. dharawalus* as satisfying IUCN criteria for listing as Critically Endangered (Coughran and Furse 2010). *Euastacus dharawalus* is considered one of Australia's most threatened crayfish species. Urgent research is required into the life history of the species, population assessment and monitoring of both the imperilled Fitzroy Falls Spiny Crayfish and the introduced competitor, *Cherax destructor*.

This current project aims to gather such biological information, and builds on the information gathered in the three previous surveys conducted by AABio staff.

#### Method

The research project will involve an intensive survey of the whole aquatic system above Fitzroy Falls, to ascertain the current distribution and relative abundances of all species. This will require an intensive capture program across the entire water body and tributaries, over a 2 day period. We know from previous research by the Australian Crayfish Project (ACP) that this species is carnivorous and readily attracted to fish baits. The capture program would be conducted with baited traps that will easily and effectively capture both crayfish species.

Crayfish will be captured, weighed, measured, and tallied. Native crayfish will be marked by clipping a uropod (Coughran 2006) and released back into the system, and exotic crayfish will be removed from the system and humanely euthanized. The survey will be conducted at approximately 10 locations around the circumference of the reservoir, as well as several sites in Yarrunga and Wildes Meadow Creeks and other minor drainage gullies.

Transects of 3 traps placed 10 metres apart will be set at 10 locations along the shore of the reservoir, and three transects of 10 traps will be set below the reservoir in Yarrunga Creek. These are baited opera house traps, they will be laid in the morning and checked every 2 hours. Traps will be emptied and reset. They will be checked throughout the day and left out overnight and checked again in the morning. Duration of the project is 2 days and 1 night.

The broad sampling will provide a rudimentary picture of approximately where *Euastacus dharawalus* and *Cherax destructor* occur within the system, and an estimate of overall population densities.

### **Deliverables**

The results of this research project will deliver:

- Preliminary distribution maps of the crayfish species within the aquatic system.
- Maps of the distribution of all species in the greater area.
- Preliminary estimates of population size and relative abundances of *E. dharawalus* and *C. destructor* within the aquatic system.
- Biological and ecological information on aspects such as wounds and disease, ectosymbionts, reproductive biology and life history, habitat requirements, etc. The information ascertained on the biology and ecology of *Euastacus dharawalus* would be used to protect and conserve the species into the future.
- Creation of a database to manage the information gathered.
- Increase in the knowledge base on the species and its habitat and improved understanding of its requirements for survival.
- The information generated may lead to conservation listing and management, etc.

Three surveys have been completed to date and those research results together with the new information gathered in this latest proposed project will be presented in this paper.

Australian Aquatic Biological P/L (AABio) currently has the permits from NSW DPI Fisheries, NSW Department of Environment and Climate Change and the SCA to conduct research and will work closely with all towards the fruition of the project and to ensure that all permits required for this project are current.

### **For Further Information**

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### **Update 2011**

Survey 1 completed 26<sup>th</sup> September 2006.

Survey 2 completed 5<sup>th</sup> March 2007

Survey 3 completed 26<sup>th</sup> January 2008

Survey 4 completed 28<sup>th</sup> April 2011  
Survey 5 completed 25<sup>th</sup> and 26<sup>th</sup> of October 2011.  
Survey 6 completed 3rd of November 2011.  
Survey 7 completed 30<sup>th</sup> of May 2012  
All surveys have now been completed and the final paper is currently out for review.

## Fisheries Scientific Committee

May 2011

Ref. No. PD 51  
File No. FSC 11/01

### PROPOSED DETERMINATION

#### **The Fitzroy Falls spiny crayfish – *Euastacus dharawalus* as a Critically Endangered Species**

The Fisheries Scientific Committee, established under Part 7A of the *Fisheries Management Act 1994* (the Act), is proposing to list the Fitzroy Falls spiny crayfish, *Euastacus dharawalus* as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 4A of the Act.  
The listing of Endangered Species is provided for by Part 7A, Division 2 of the Act.

Update:

The NSW Scientific Committee listed the Fitzroy Falls spiny crays as critically endangered and it was gazetted in March 2012.

They have produced a PRIME FACT SHEET, a copy follows.....

November 2011

Ref. No. FD 49  
File No. FSC 11/01

### FINAL DETERMINATION

#### **The Fitzroy Falls spiny crayfish – *Euastacus dharawalus* as a Critically Endangered Species**

The Fisheries Scientific Committee, established under Part 7A of the *Fisheries Management Act 1994* (the Act), has made a final determination to list the Fitzroy Falls spiny crayfish, *Euastacus dharawalus* as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 4A of the Act.

The listing of Endangered Species is provided for by Part 7A, Division 2 of the Act.

The Fisheries Scientific Committee, with reference to the criteria relevant to this species, prescribed by Part 16 of the *Fisheries Management (General) Regulation 2010* (the Regulation) has found that:

#### **Background**

- 1) *Euastacus dharawalus* (Morgan, 1997), is a valid recognised taxon and is a species as defined in the Act. The species is endemic to Wildes Meadow Creek (Shoalhaven catchment) and is restricted to that part of the waterway upstream of Fitzroy Falls (a total of ~12 km of waterway with mean daily flow > 5 ML d<sup>-1</sup>). Of this, only 1 km is of high quality habitat protected within Morton National Park, 3.2 km has been inundated by Fitzroy Falls Reservoir and the remainder is within agricultural land. Existing data (McCormack, unpublished data) suggests that the extent of occurrence is estimated to be <0.1 km<sup>2</sup>.
- 2) *Euastacus dharawalus* represents a monophyletic group within the southern clade of *Euastacus* species, with the closest related species being *Euastacus claytoni*, *Euastacus brachythorax*, *Euastacus guwinus* and *Euastacus yanga* (Baker *et al.*, 2004; Shull *et al.*, 2005).

- 3) The species has only been recorded from two sites, one above (Shull et al. 2005) and one below (McCormack and Coughran 2010) Fitzroy Falls Reservoir. Only limited (and unpublished) abundance data have been collected by McCormack and Coughran (2010). Furse and Coughran (2011) suggest the species is critically endangered and facing imminent extinction. There are no other population data available for *Euastacus dharawalus* (Coughran and Furse, 2010).
- 4) The maximum reported size of *Euastacus dharawalus* is 86 mm OCL and 300 g (McCormack and Coughran, 2010).
- 5) The species is most active late afternoon and early evening (McCormack, 2008).
- 6) The species occupies burrows below the waterline and although they are surmised to spend extended periods of time in their burrows, they are often observed actively foraging upon the substratum (McCormack, 2008).
- 7) Fertilisation occurs from May to June. Females tend the eggs and larvae under her abdomen until juveniles disperse in December (McCormack, 2008). Not all females breed each year (McCormack, 2008).
- 8) A 65 mm OCL female was reported to be carrying 512 eggs in September (McCormack, 2008).

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### **Criteria – reduction in abundance, geographic distribution or genetic diversity (Regulation clause 274)**

- 1) The only abundance data available from Wildes Meadow Creek was collected during surveys in 2006, 2007 and 2008 (McCormack and Coughran, 2010). Each of these surveys detected three *Euastacus dharawalus* within a 40 m section of creek; however, all individuals sampled during the 2008 survey displayed injuries consistent with aggressive competitive or predatory interactions with other crayfish (Coughran *et al.*, 2009). The appearance of injured *Euastacus dharawalus* coincided with an increase in the densities of *Cherax destructor* from  $n = 2$  in 2006 to  $n = 73$  in 2008.
- 2) Construction of Fitzroy Falls Reservoir in 1974 inundated 25% of the known lotic habitat occupied by *Euastacus dharawalus*.
- 3) A limited geographic range, single known population, low population abundance, increasing densities of *Cherax destructor* within habitats occupied by *Euastacus dharawalus*, and associated injuries to the remaining *Euastacus dharawalus* individuals (Coughran *et al.*, 2009), indicate that the species is likely to undergo a very large reduction in abundance in the near future.
- 4) The Fisheries Scientific Committee has had regard to the following in determining the extent of the reduction referred to above:
  - (a) Restricted or disjunct populations of naturally rare and uncommon species,
  - (b) The precautionary principle, namely, that if there are threats of serious or irreversible damage to the species, lack of full scientific certainty should not be used as a reason for postponing measures to prevent that damage,
  - (c) Other evidence
- (i) Expert advice.

### **Criteria – threatening processes (Regulation clause 275)**

- 1) A crayfish species native to the Murray Darling Basin, *Cherax destructor*, has been introduced in the waterway occupied by *Euastacus dharawalus*. This crayfish is aggressive, more prolific and faster growing than *Euastacus dharawalus*. Recent information on density suggests that *C. destructor* may be able to outcompete *Euastacus dharawalus* (Coughran *et al.*, 2009), as *C. destructor* persists at densities approximately 25x that of *Euastacus dharawalus* in the resident stream (Coughran *et al.*, 2009). In recent surveys, all individuals sampled displayed injuries consistent with aggressive competitive or predatory interactions with other crayfish.
- 2) The presence of introduced salmonids within the stream pose a potential threat to *Euastacus dharawalus* (Horwitz, 1990; Merrick, 1995; Furse and Coughran, 2011). Although interactions between these species and *Euastacus dharawalus* have not directly been observed, salmonids are known to prey on crayfishes. Other exotic species (cats, foxes, pigs, goats) that have generally been found to impact on crayfish also occur in this species' range (Coughran and Furse, 2010). These exotic species could predate on *Euastacus dharawalus*.
- 3) Recreational fishers target crayfish within Wildes Meadow Creek. Whilst current fishing regulations prohibit the taking of eastern spiny crayfishes with OCL < 90 mm, there is potential for misidentification with the more common *Cherax destructor*, which did not have any minimum length regulation. There are currently no guidelines or education materials to alert the recreational fishing community to the presence and status of *Euastacus dharawalus*.

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- 4) River regulation downstream of Fitzroy Falls Reservoir may impact upon *Euastacus dharawalus* (Furse and Coughran, 2011).
- 5) The Fisheries Scientific Committee has had regard to the following in determining the extent of the threats referred to above:
  - (a) The nature of threatening processes,
  - (b) The potential for synergistic effects between threatening processes, and
  - (c) The extent of threatening processes relative to the geographic distribution of the species. ,

#### **Conclusion pursuant to section 220F(2) of the Act**

In the opinion of the Fisheries Scientific Committee:

*Euastacus dharawalus* – the Fitzroy Falls spiny crayfish is facing an extremely high risk of extinction in New South Wales in the immediate future, as determined in accordance with the criteria prescribed by the Regulation as discussed above.

The species is eligible to be listed as a **CRITICALLY ENDANGERED SPECIES**.

#### **Sources and Links**

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Chairperson

Fisheries Scientific Committee