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.

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^{-1}). 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 Existing data (McCormack, unpublished data) suggests that the extent of occurrence is estimated to be 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^2.

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 Only limited (and unpublished) abundance data have been collected by McCormack and Coughran (2010).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).

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*.

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

Baker, A. M., Hughes, J. M., Dean, J. C. & Bunn, S. E. (2004). Mitochondrial DNA reveals phylogenetic structuring and cryptic diversity in Australian freshwater macroinvertebrate assemblages. *Marine and Freshwater Research* **55**, 629-640.

Coughran, J. & Furse, J. M. (2010). An assessment of genus *Euastacus* (49 species) versus IUCN Red List criteria. International Association of Astacology: Auburn University, Alabama. 170 p.

Coughran, J., McCormack, R. B. & Daly, G. (2009). Translocation of the Yabby *Cherax destructor* into eastern drainages of New South Wales, Australia. *Australian Zoologist* **35**, 100-103.

Furse, J. M. & Coughran, J. (2011). An assessment of the distribution, biology, threatening processes and conservation status of the freshwater crayfish, genus Euastacus (Decapoda: Parastacidae), in continental Australia. III. Case studies and recommendations. *Crustaceana Monographs* **15**, 265-274.

Horwitz, P. (1990). The conservation status of Australian freshwater crustacea with a provisional list of threatened species, habitats and potentially threatening processes. Australian National Parks and Wildlife Service: Canberra. 121 p.

McCormack, R. B. (2008). The freshwater crayfish of NSW Australia. Aquatic Biological Pty Ltd: Karuah.

McCormack, R. B. & Coughran, J. (2010). Conservation of imperilled crayfish: The Fitzroy Falls crayfish *Euastacus dharawalus* Morgan 1997 (DRAFT REPORT). Aquatic Biological Pty Ltd: Karuah. 11 p.

Merrick, J. R. (1995). Diversity, distribution and conservation of freshwater crayfishes in the eastern highlands of New South Wales. *Proceedings of the Linnean Society of New South Wales* **115**, 247-258.

Morgan, G. J. (1997). Freshwater crayfish of the genus *Euastacus* Clark (Decapoda: Parastacidae) from New South Wales, with a key to all species of the genus. *Records of the Australian Museum* **Supplement 23**, 1-110.

Shull, H. C., Perez-Losada, M., Blair, D., Sewell, K., Sinclair, E. A., Lawler, S., Ponniah, M. & Crandall, K. A. (2005). Phylogeny and biogeography of the freshwater crayfish *Euastacus* (Decapoda: Parastacidae) based on nuclear and mitochondrial DNA. *Molecular Phylogenetics And Evolution* **37**, 249-263.

Dr Jane Williamson
Chair
Fisheries Scientific Committee