NRM North

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Why did the crayfish cross the road?

The impacts of culverts on movement of giant freshwater crayfish populations

BACKGROUND

The giant freshwater crayfish (*Astacopsis gouldi*) is the largest freshwater invertebrate in the world and is endemic to northern Tasmanian catchments that flow into Bass Strait (except the Tamar) and the Arthur catchment.

The species is long-lived but slow growing and is listed as vulnerable under the Tasmanian *Threatened Species Protection Act 1995* and federal *Environment Protection and Biodiversity Conservation Act 1999.* It is also the only species in Tasmania listed with the *International Union for Conservation of Nature* as an internationally red-listed threatened species.

Current and ongoing threats to the species include sedimentation of waterways, poaching, drought, flood, climate change and habitat loss and disturbance.

Habitat loss and disturbance includes:

- removal of native riparian vegetation and in-stream woody debris
- riverbank erosion and channelisation
- runoff of chemicals and fertiliser
- in-stream accumulation of sediment
- flow alteration
- instream barriers such as culverts, stock crossings and in-stream dams.

The surface area of rocks in the natural habitat of giant freshwater crayfish help to slow down water velocity and create natural pools for resting places. Image credit: Dan Broun.

IN-STREAM BARRIERS – GETTING TO THE OTHER SIDE

Giant freshwater crayfish move to different locations in waterways to evade predators, access cooler water or shelter, find food, and to seek mates for breeding and reproduction. However, in an unusual phenomenon, individuals have been observed avoiding stream crossing infrastructure (e.g. culverts) and instead crossing roads in several locations throughout their habitat range. So why would our iconic waterway giants go to such lengths, and risk becoming roadkill in the process? The answer is the same as for the chicken in the classic riddle – to get to the other side.

Typical stream crossing infrastructure in Tasmania includes bridges, arch culverts, open and closed-bottom box culverts and pipe culverts. Giant freshwater crayfish have

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This project is funded by the Australian Government's Natural Heritage Trust and delivered by NRM North, a member of the Commonwealth Regional Delivery Partners panel.

always had to negotiate natural barriers such as log jams and waterfalls, but the development of more roads across northern Tasmania means the number of man-made barriers within catchments has substantially increased over time. The three main ways culverts, particularly pipe culverts, can impede passage of giant freshwater crayfish and other aquatic species are:

1. Concentrated flow: by reducing the stream width that water must pass through, the stream flow is concentrated, and the water velocity increases, making it difficult or even impossible for some species to pass through during periods of high flow.

2. Reduced grip: the concrete surface of pipe and closed-bottom box culverts is smooth and slippery, designed to allow water to flow quickly through. This is problematic for species movement because the smooth surface lacks grip for giant freshwater crayfish to gain traction. The natural stream habitat of giant freshwater crayfish is rocky and contains woody debris, which helps to slow down water flow, and creates natural pools where aquatic species can rest as they move through the stream. Because the natural rocky stream substrate under bridges and open bottom culverts is usually still present, they typically do not present barriers to species movement in the way that culverts do.

3. Perched steps: If culvert pipes, box culverts, or the concrete slabs that they are positioned on, are "perched" above the stream bed or water surface, it creates a floating step that can be difficult or even impossible to negotiate. For fish species, this creates a dam effect, leaving them stranded upstream or downstream of the culvert. For giant freshwater crayfish, it typically leads to them negotiating the slippery riverbanks to cross the road to the other side.

Giant freshwater crayfish are unable to even attempt passage through culverts that are "perched" above the water surface. Image credit: Todd Walsh.

STREAM CROSSING CONSIDERATIONS

Research into stream crossing designs and the impact on aquatic species is ongoing. Trials are underway at several sites where artificial substrates have been retrofitted into existing culverts to address accessibility issues for aquatic species, including giant freshwater crayfish.

As outlined in the Department of Natural Resources and Environment's *Wetlands and Waterways Works Manual - No. 5 Environmental Best Practice Guidelines: Siting & Designing Stream Crossings (2003),* "when installing new crossings or upgrading existing crossings, the type of infrastructure used will depend on the crossing's purpose and anticipated frequency of use, the site characteristics (bank height, bed stability, flow regime, depth etc.) and budget. If possible and appropriate, use the structure that is least likely to cause environmental harm. Generally, in descending order of preference, use bridges, arch culverts, open-bottom box culverts, closed-bottom box culverts and pipe culverts." (pg.1).

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FURTHER READING:

Commonwealth of Australia (2017). *Recovery Plan for the Giant Freshwater Crayfish (Astacopsis gouldi).* Commonwealth of Australia, Canberra. *Recovery Plan for the Giant Freshwater Crayfish (Astacopsis gouldi).* Commonwealth of Australia, Canberra.

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Forest Practices Authority (2013). *Guidelines for the design and maintenance of stream crossings for the passage of fish and other aquatic fauna – culverts, Fauna Technical Note No. 15.Guidelines for the design and maintenance of stream crossings for the passage of fish and other aquatic fauna – culverts, Fauna Technical Note No. 15*. Forest Practices Authority, Hobart.

International Union for Conservation of Threatened Species (IUCN) (2025). *IUCN Red List of Threatened Species.* Available at https://iucn.org/resources/conservation-tool/iucn-red-list-threatened-species.

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