Mount Roland
LAND CARE

Culverts for Crayfish

Creating Safe Corridors for Tasmania's endangered Giant Freshwater Crayfish

Oct 2026







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SUMMARY

This report presents the findings of Mount Roland Land Care's *Culverts for Crayfish* project.

This 2026 project builds on previous work which revealed that round, plastic, under-road culverts are a barrier to the upstream travel of the threatened Giant Freshwater Crayfish (GFC) (*Astacopsis gouldi*). The GFC were unable to gain traction on the smooth base of the culvert.

In this year's trials we demonstrate that a simple, inexpensive modification with rubber mats provides a "grippy" substrate which is suitable for GFC. Employing a combination of remote camera and micro-chip scanner technology we show a total of 117 confirmed passages of GFC on the mats (including 60 upstream).

Our trials also suggest that a "perched" culvert, where the outflow end of the culvert is higher than the stream below, may impede GFC travel. Additionally, our footage indicates that such a perch is a problem for the movement of platypus (*Ornithorhynchus anatinus)* and rakali (*Hydromys chrysogaster*).

Our subsequent, small-scale, field trials indicate that a simple ramp of paddock rock is a remediation which will be used by all three species. Platypus and rakali utilized the rock ramp on numerous occasions, and GFC used the ramp twice (once in each direction). Further trials could provide additional data.

A particularly note-worthy achievement of the project is the quantity of high-quality camera footage obtained and viewable through this report.

The report also incorporates discussion of other potential culvert substrates, methods of new culvert installation, and suggestions for future work. The promotion of a wildlife-friendly culvert design, based on our findings, is a key aspect of future work.

This project was made possible by the generous support of the Wettenhall Environment Trust.

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WHO IS THIS REPORT FOR?

This report is intended to be an easy-to-read document with a minimum of specialist language. We hope it will be of interest to those who manufacture, install or maintain under-road culverts - including local councils, state government agencies, forestry companies, farmers and small landholders. We expect the report will also be of interest to those seeking to learn more about the behaviour of Giant Freshwater Crayfish (GFC). Additionally, the report is written for the project's funding body, the Wettenhall Environment Trust.

In the near future we will publish a more technical report focusing on the remediation of perched culverts, as well as short fact sheets designed as 'quick guides' for those who install and maintain culverts.

BACKGROUND

Mount Roland Land Care (MRLC) has been investigating the use of under-road culverts by the Giant Freshwater Crayfish (GFC) for the last four years. The project began when a member saw a crayfish crossing a busy road rather than using a culvert. This turned out to be one of many sightings. Local, anecdotal sources suggest that GFC will not use culverts under any circumstances. Given that the GFC (*Astacopsis gouldi*) is already on the IUCN Red List of Threatened Species, this culvert-avoidance behaviour was of great concern.[1]

The GFC is the largest freshwater invertebrate in the world and lives only in northern Tasmania. Little is known about the GFC, but it has been observed to move up and down waterways as part of its life cycle. Where in-stream passage is blocked, animals may leave the waterway, increasing their exposure to dangers such as predation and road traffic.

Our 2025 work had two important findings. First, we showed that GFC can use a culvert in certain circumstances. Specifically, we revealed that GFC will use round plastic culverts, with no lip, for down-stream travel. Second, we showed that GFC are unable to use unmodified round plastic culverts for up-stream travel as they are unable to gain traction on the smooth

[1] The conservation status of the GFC is listed as “Endangered” by the IUCN, and “Vulnerable” by both the Commonwealth and Tasmanian governments.

culvert interior when heading up against the water flow.

In this 2026 study our primary goal was to identify practical, cost-effective, environmentally-sensitive ways to modify existing culverts so that they would be readily used by GFC for downstream and upstream travel. We also aimed to provide guidelines for the design of new culverts, enabling them to be GFC-friendly from the outset. Additionally, we were aware that other riverine wildlife might be experiencing similar problems with culverts – we hoped that our trials might shed light on this little-studied phenomenon.

TRIALS and WORKS OVERVIEW

Our efforts in 2026 focused on sites in the Circular Head Municipality where we had access to secluded, privately-owned properties; remote monitoring was possible here without the risk of equipment theft. In addition to monitoring the movements of GFC through culverts, we also collected data on water temperature as well as some data on water velocity and river levels. Rainfall figures were provided by a land-owner. An unanticipated bonus was the quantity of excellent footage we gathered on platypus (*Ornithorhynchus anatinus)* and rakali (*Hydromys chrysogaster*) movements around culverts. In the report below we have summarised the information which is directly relevant to culvert travel, however our trials have yielded considerably more data. We will provide this in subsequent publications. We believe our data is an excellent foundation for further research into the behaviour of GFC, platypus and rakali. In the case of GFC, our results can also be combined with the micro-chip tagging work of Todd Walsh which itemises the sex, approximate age, life cycle stage and previously-captured locations of individuals recorded on our culvert scanners.

In the Kentish Municipality, we continued our work from 2024-5 by documenting the durability of previous culvert modifications. In the report below we also describe a new culvert installation by the Kentish Council, and one by MRLC.

CAMERA FOOTAGE

For all of the GFC, platypus and rakali pictures provided in the report, complete photo sequences and/or videos can be viewed by clicking on the link below the picture. For this report we present illustrative footage of each kind of interaction with the culvert, however

we recorded over 200 interactions by individual animals.

We believe we have gathered the first ever visual evidence of GFC interactions with culverts with a total of 118 photo sequences and videos.[2] Both day and night movements are documented.

Our platypus and rakali footage is also ground-breaking and significantly adds to our knowledge of these species' movements through culverts.

TRIALS IN THE CIRCULAR HEAD MUNICIPALITY, NORTH-WEST TASMANIA

Between February and June 2026, we conducted trials at five culverts (two installed by us, three existing). A summary of the culvert types is provided below in Table 1.

CULVERT A. New culvert.

At CULVERT A we positioned a new plastic culvert (refer Table 1 for details) in a river section. Courtesy of the prior work of Todd Walsh, the river is known to be inhabited by micro-chipped GFC.[3] We also placed 1.2m long mesh funnels at approx. 45 degrees on the river side of culvert, to effectively narrow the waterway and more closely replicate an actual culvert situated under a road. Mesh funnels roughly parallel to the bank were placed on the bank side. The mesh funnels did not impede water flow. The culvert and funnels occupied less than 50% of the river width.

The type of culvert and the location replicated that of our 2025 study (see above). That 2025 data provided baseline information for an unmodified culvert. In 2026, we added a modification from the outset: rubber mats (60cm x 40cm) placed on the bottom of the culvert and held in place by two strands of rope (Fig. 1-3). The rope was secured at both ends to a

[2] Our preliminary work in 2025 captured footage of seven GFC movements in the vicinity of a culvert.
[3] Todd Walsh has permits to catch and release GFC for study purposes: *Inland Fisheries Service Permit D26-40897 (31-03-2027), NRE Listed Taxon Permit 2603014 (21-10-2029), Scientific or Educational Wildlife Permit no: 2603015 (21-10-2029).*

shackle on a galvanized star picket driven into the stream bed attached at or below substrate level.

We then monitored the culvert over 16 weeks, using a microchip scanner placed under the culvert, and cameras positioned to show the downstream end of the culvert. A total of three cameras were used to provide day-time and night-time coverage. Our volunteers visited the site (and all of the others at Circular Head) every 7-10 days: this allowed us to perform routine maintenance, change camera batteries and SD cards, and adjust the cameras if our set up was not correct. Details of the cameras and scanner are given in Appendix D.

The water depth inside the culvert was variable, ranging from 5cm to 15cm, and occasionally up to 25cm and more after heavy rainfall.

Table 1. Summary of Culverts at Circular Head Trial Sites.

	CULVERT A	CULVERT B	CULVERT C	CULVERT D	CULVERT E
Culvert Type	New mock culvert, round, corrugated plastic with smooth PVC interior. Length 2.9m, Diameter .525m	New mock culvert, round, corrugated plastic with smooth PVC interior. Length 2.9m, Diameter .525m	Existing culvert, round, composite. Perch at outflow 20cm. Length 6m, Diameter .4m	Existing culvert, round, concrete. Perch at outflow 42cm. Length 6m, Diameter .4m.	Existing culvert, round, concrete. Perch at outflow 20cm. Length 6m, Diameter .6m.
Culvert Location	River	River	Small on-farm drainage channel	Small on-farm drainage channel	Small on-farm drainage channel
Baseline Monitoring (no Modification)	2025 (28 days)	2025 (28 days)	9 Feb-23 Mar (42 days)	9 Feb-30 Mar (49 days)	30 Mar-6 Apr (7 days)
1. Modification Type/Dates/Duration	Rubber mats in culvert base from outset 9 Feb – 8 Jun 119 days	Fibre Reinforced Plastic (FRP) in culvert base from outset 9 Feb – 1 Mar, 9 Mar – 6 Apr 41 days total	Ramp of Fibre Reinforced Plastic (FRP) 23 Mar – 30 Mar 7 days	Ramp of paddock rock 30 Mar – 10 May 41 days	Ramp of paddock rock 6 Apr – 10 May 34 days
2. Modification Type/Dates/Duration			Ramp of paddock rock 30 Mar – 10 May 41 days		
3. Modification Type/Dates/Duration			Rubber mats in culvert 27 Apr – 10 May 13 days		



Figure 1. CULVERT A. MRLC Volunteers Setting Up Culvert.

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Figure 2. CULVERT A. Viewed from Downstream

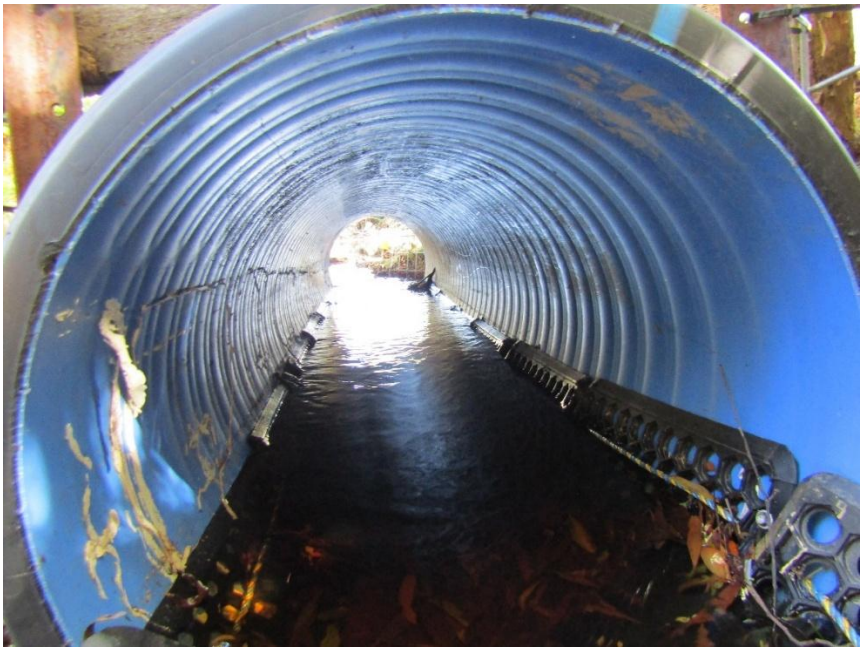


Figure 3. Rubber Mats at CULVERT A.

GFC AT CULVERT A:

In our 2025 work, we revealed that GFC were able to use an unmodified plastic culvert for downstream travel.[4] However, for upstream travel they by-passed the culvert and travelled via the bank (Fig. 5). When our expert, Todd Walsh, physically placed a GFC in the downstream end of the culvert, the GFC was unable to gain purchase on the slippery bottom of the culvert: despite attempting to gain access he was repeatedly washed back out (Fig. 4).

[4] *So why did the Giant Freshwater Crayfish cross the road. New findings from a Mount Roland Land Care study*. https://www.mountrolandlandcare.org.au/_files/ugd/69720d_8a4bc3a8ab454ca780e874c486f9eff2.pdf



Figure 4. CULVERT A. PRE-MODIFICATION. 2025. Placed GFC Unable to Gain Traction on Bare Culvert Base when Heading Upstream.

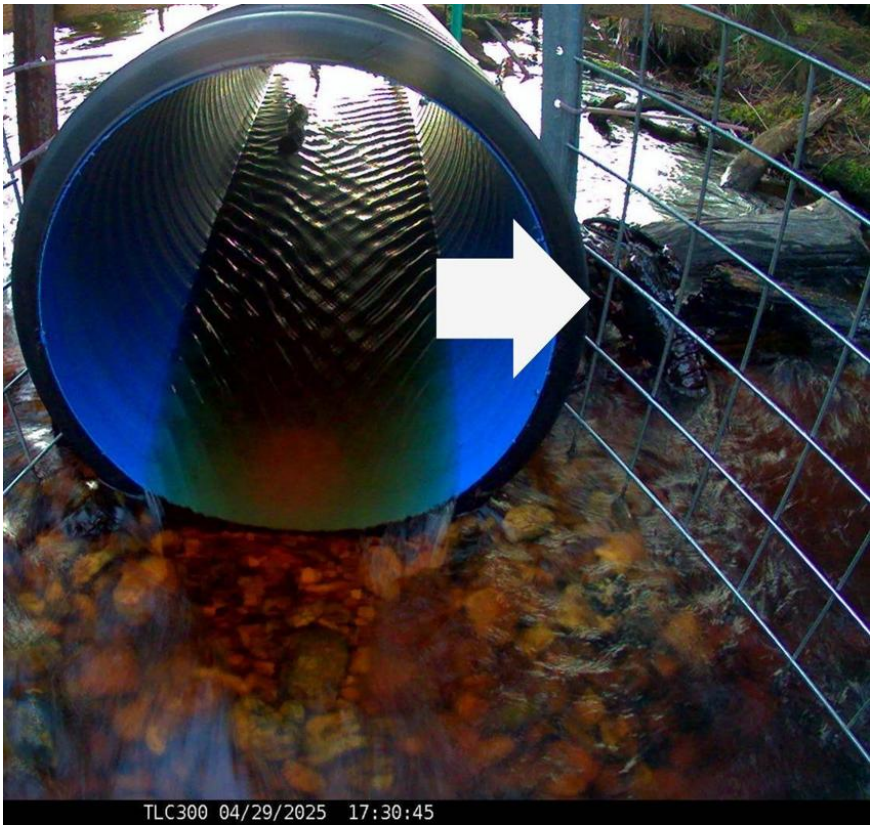


Figure 5. CULVERT A. PRE-MODIFICATION. 2025. GFC Bypassing Culvert When Heading Upstream.

In this 2026 study we show that rubber mats provide a highly effective grippy substrate for GFC. During 16 weeks of monitoring, the cameras and scanner produced 123 passage records. However, six camera passages could not be date-matched to eight scanner detections so between zero and six records may be duplicates. The records therefore represent at least 117 and as many as 123 distinct passages. We did not observe any by-passes or failures to enter the culvert. Our camera footage shows GFC travelling on the mats easily and with no hesitation, including for upstream travel (60 passages) against significant water flow. See Fig. 6-11. The scanner data revealed 13 different individuals used CULVERT A, with a further 14 passages of un-microchipped GFC. We were particularly pleased to observe a juvenile GFC, approximately 7cm in length, using the mats for upstream passage (Fig. 11).

For a summary of GFC movements at CULVERT A see Table 2, below. A complete list is provided in Appendix A.

Table 2. Summary of GFC Movements at CULVERT A.

	Total Passages (inc. scanner and camera recordings)	Travelling Up	Travelling Down	Unknown Direction (recorded on scanner only)	**Bypass of culvert**	**Failure to enter culvert or complete passage**
Baseline Monitoring 2025 (28 days)	8	0	4	4	3 (all travelling up)	0
With Rubber Mat Modification (119 days)	123 (see the qualification above - p. 13)	60	27	36	0	0

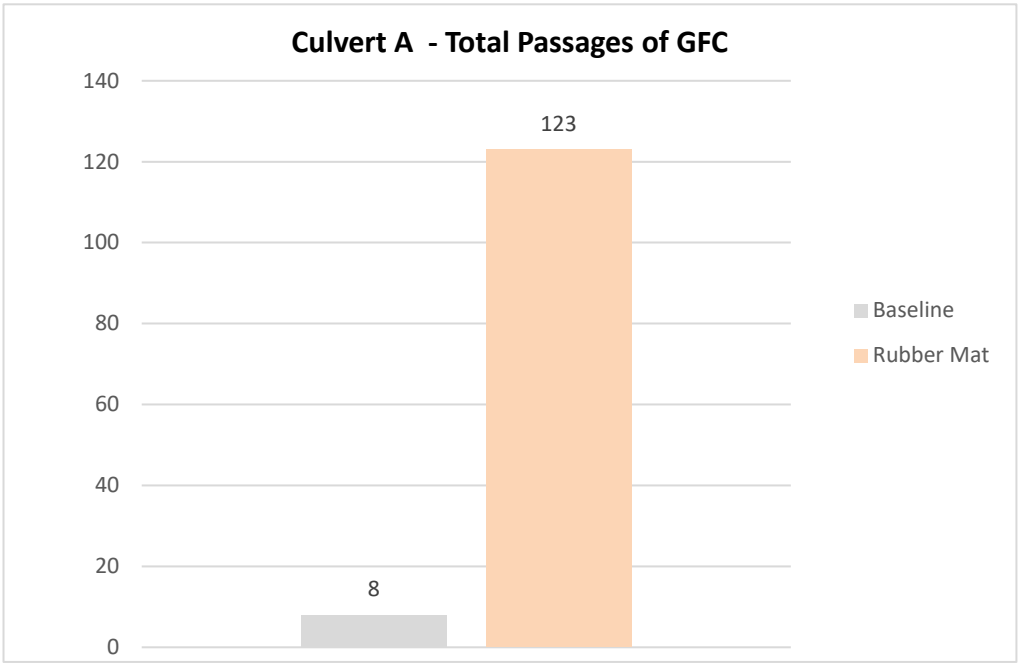


Figure 6. CULVERT A. Total GFC Passages.

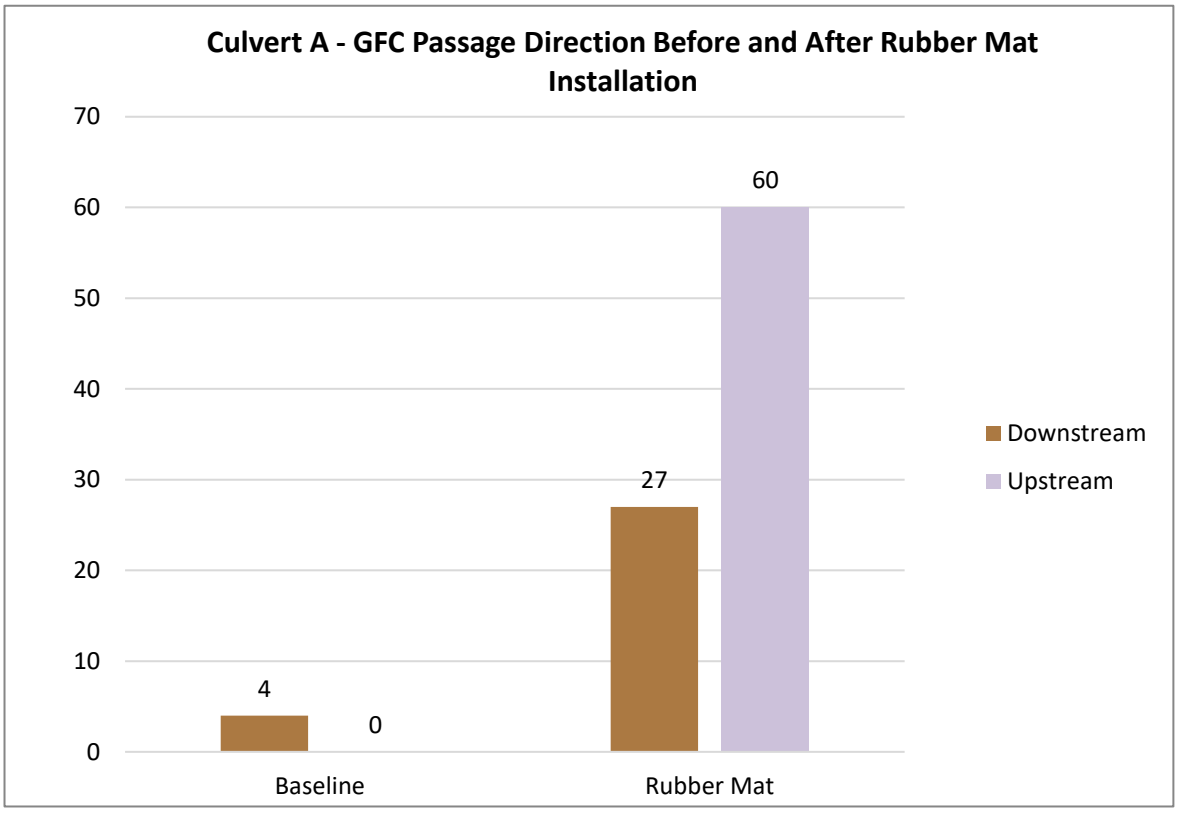


Figure 7. CULVERT A. GFC Passage Direction.

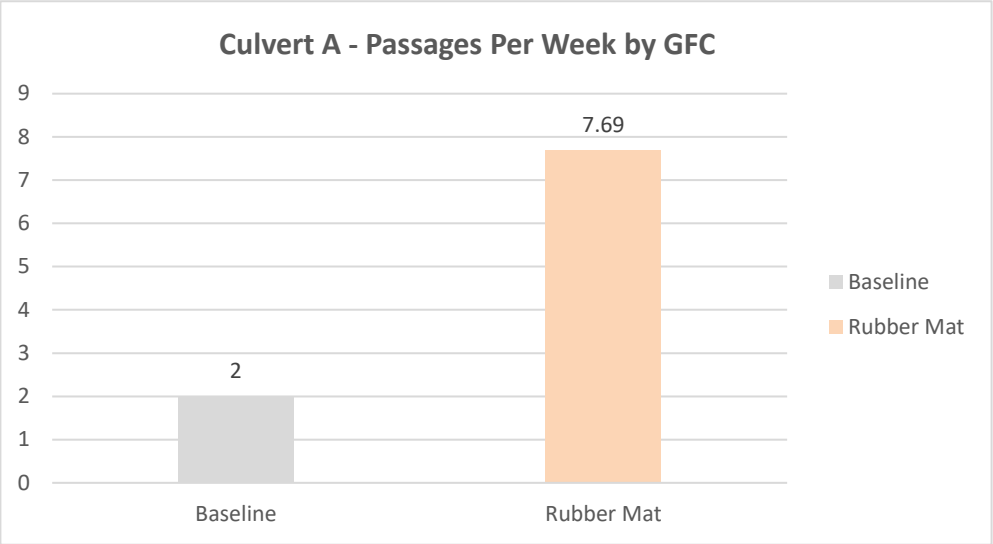


Figure 8. CULVERT A. GFC Passages per Week.



Figure 9. CULVERT A. GFC Travelling Downstream over Rubber Mats.
Click below to view picture sequence:
www.mountrolandlandcare.org.au/culverts-gfc-down-rubber-mats



Figure 10. CULVERT A. GFC Travelling Upstream Using Rubber Mats.
Click below to view picture sequence:
www.mountrolandlandcare.org.au/culverts-gfc-up-rubber-mats

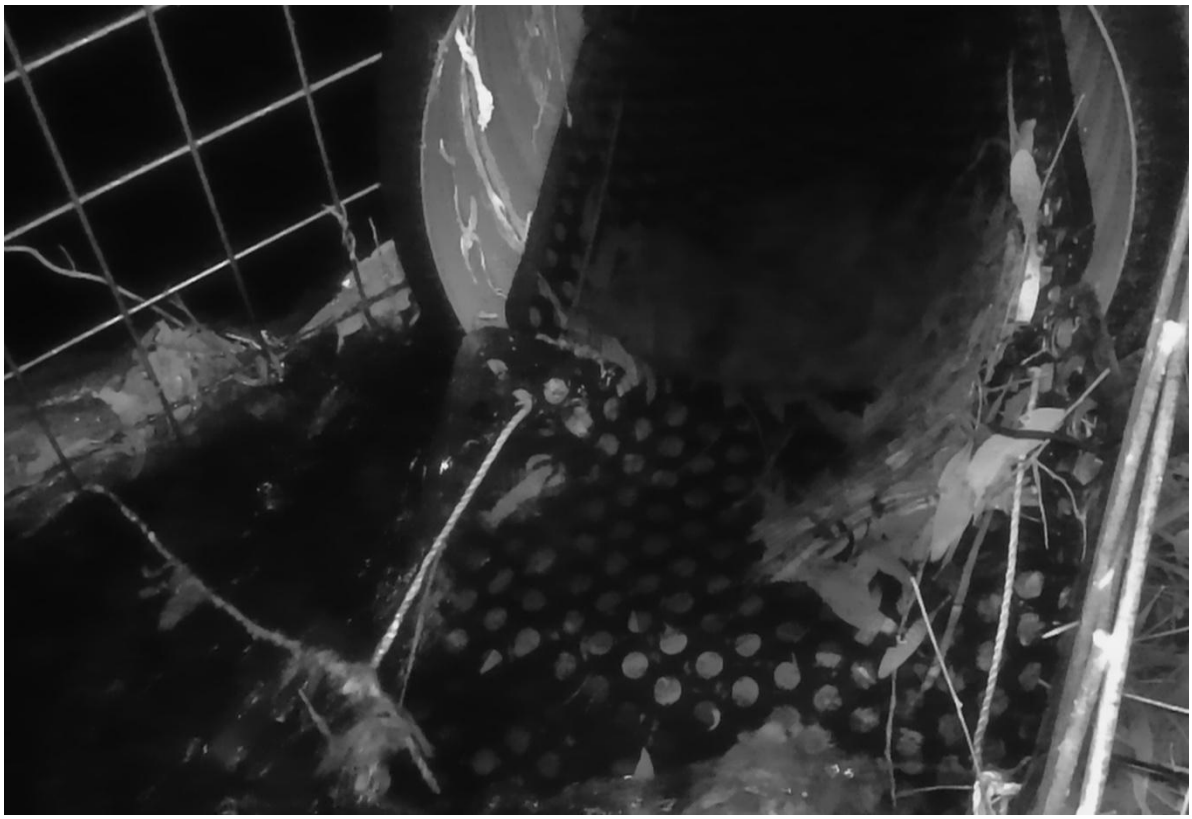


Figure 11. CULVERT A. Juvenile GFC (7 cm. length approx.) using Mats for Upstream Travel.
Click below to view picture sequence:
www.mountrolandlandcare.org.au/culverts-juvenile-gfc-up-rubber-mats

CULVERT B. New culvert.

At CULVERT B the basic set-up mirrored that of CULVERT A. Instead of rubber mats, however, we placed FRP (Fibre Reinforced Plastic) on the base of the culvert. The sections of FRP (approx. 25cm wide, 1.5m long) were secured at each end with galvanized steel linked chains. The chains were attached to steel droppers with shackles (Fig. 12).

The 2025 baseline data at the CULVERT A location is taken to be roughly applicable here, as the unmodified culverts were exactly the same. CULVERT B was positioned in a river section, about 1km upstream from CULVERT A.

As at CULVERT A, we used a microchip scanner placed underneath the culvert and remote cameras. We used a combination of cameras (three to five) to show the downstream end of the culvert. The monitoring period was 41 days.

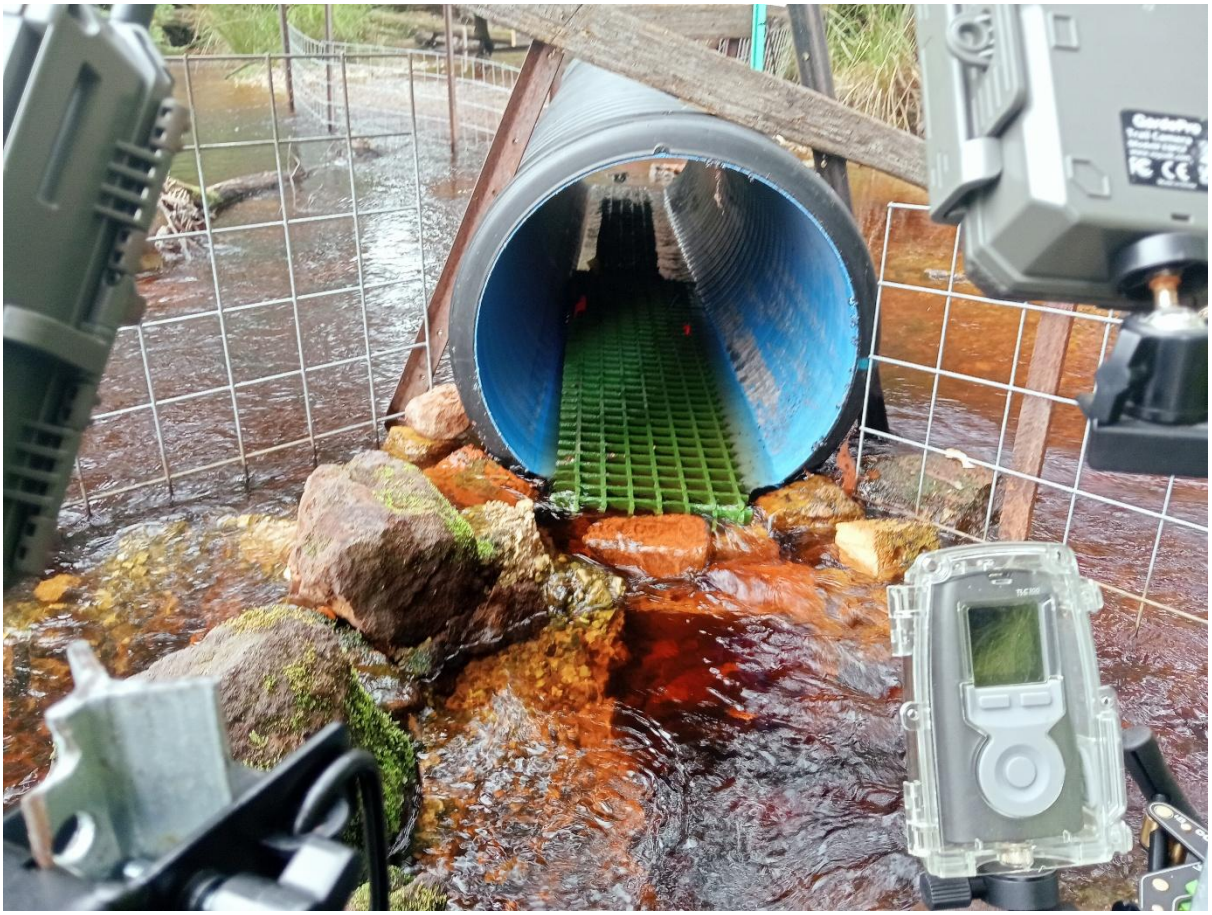


Figure 12. CULVERT B. FRP on Base.

GFC AT CULVERT B:

The footage we gathered here demonstrates that FRP is a more problematic culvert modification for GFC. Our cameras recorded a total of 25 GFC interactions with the culvert. Of these, nine show the GFC either by-passing the culvert, not entering the culvert, or starting travel on the FRP but then backing out (see Fig. 14 for an example). A total of 13 completed passages is shown on the footage, however the GFC are moving more slowly and tentatively on the FRP compared to the rubber mats at CULVERT A. An example of this can be seen in Fig. 15.

The scanner data revealed only one individual using the culvert (six passages) with an additional six passages by un-microchipped GFC.

For a summary of GFC movements at CULVERT B see Table 3. More details are provided in Appendix B.

Table 3. Summary of GFC Movements at Culvert B.

	Total Passages (inc. scanner and camera recordings)	Travelling Up	Travelling Down	Unknown Direction (recorded on scanner only)	**Bypass of culvert**	**Failure to enter culvert or complete passage**
Baseline Monitoring 2025 (28 days)	8	0	4	4	3 (all travelling up)	0
With FRP Modification (41 days)	14	6	7	1	2 (travelling up)	7

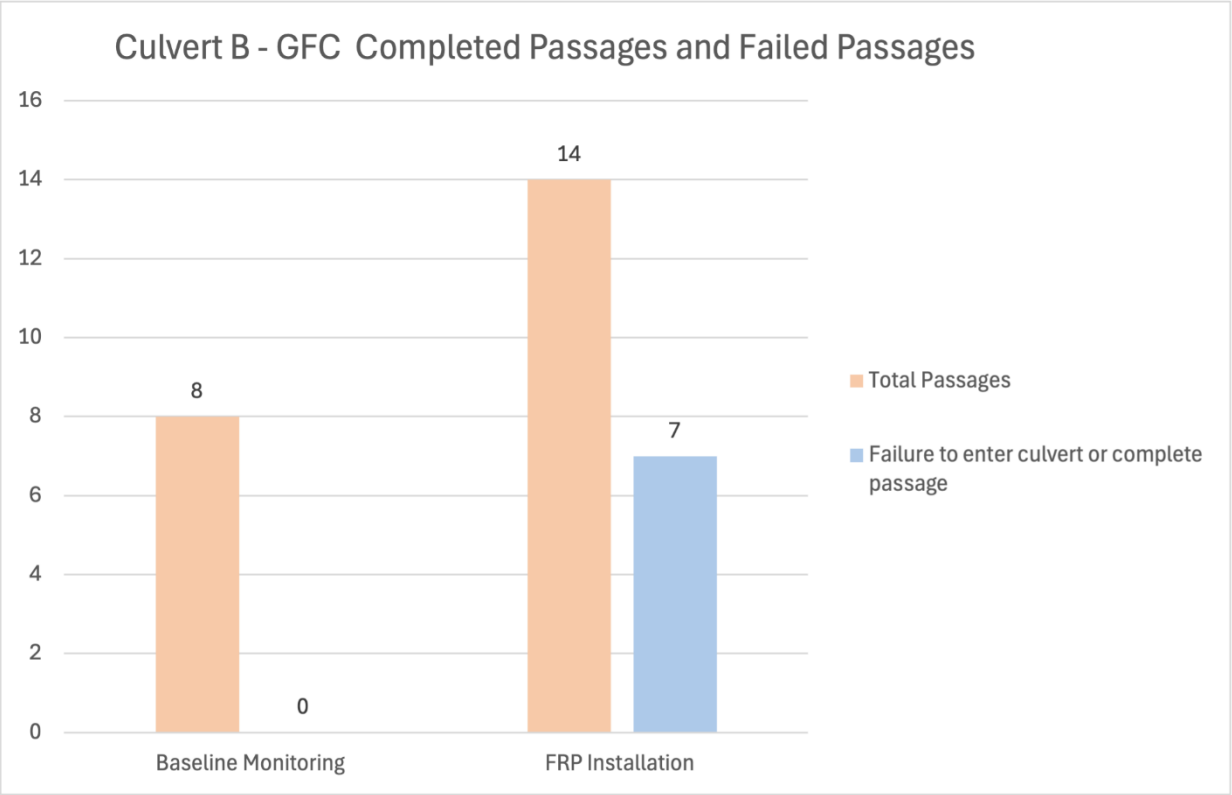


Figure 13. GFC Completed Passages and Failed Passages at CULVERT B.



Figure 14. CULVERT B. GFC Failing to Complete Passage.

Click below to view video:

www.mountrolandlandcare.org.au/culverts-gfc-frp-fail



Figure 15. CULVERT B. GFC Using Culvert - Slowly Compared to Culvert A.
Click below to view video:
www.mountrolandlandcare.org.au/culverts-gfc-frp-slow

CULVERT C. Existing culvert with perch at outflow.

This existing culvert is located in a small water course which flows into the river described above. The culvert outflow is about 3m from the river and is perched about 20 cm above the stream bed (Fig. 16).[5] Following a 42-day period of baseline monitoring we made three modifications to the culvert. The first was a short ladder of FRP up to the perch (Fig. 17). Due to concerns about GFC legs becoming caught in the mesh, this was removed after seven days. We then installed a ramp of paddock rock at the outflow. Rocks were delivered and rough-placed by a tractor, and the final ramp was configured by hand (Fig. 18). A month later we installed rubber mats on the base of the culvert (Fig. 19).

Remote cameras were positioned at the outflow, and a micro-chip scanner was placed at the inflow entry to the culvert for the final month of the trial.

At this culvert we recorded a small number of GFC movements compared to culverts A and B, however our cameras captured many passages of platypus and rakali.



Figure 16. CULVERT C. Before Modifications Showing Perch at Outflow.

[5] In this report a "perch" is the distance between the bottom of the culvert and the bed of the water course.



Figure 17. CULVERT C. FRP Ramp Modification.



Figure 18. CULVERT C. Rock Ramp Modification.



Figure 19. CULVERT C. Rubber Mats Modification.

GFC at CULVERT C:

We recorded a total of three passages of GFC at CULVERT C:

1. a GFC trying to exit the culvert on a hot afternoon but having difficulties with the perch (Fig. 20)
2. a GFC using our installed rock ramp for downstream travel (Fig. 21)
3. a GFC using our installed rock ramp for upstream travel (Fig. 22)



Figure 20. CULVERT C. GFC Experiencing Problems Exiting Perched Culvert.
Click below to view pictures and videos:
www.mountrolandlandcare.org.au/culverts-gfc-perched-culvert



Figure 21. CULVERT C. GFC Using Rock Ramp for Downstream Travel.
Click below for picture sequence:
www.mountrolandlandcare.org.au/culverts-gfc-rock-ramp-down



Figure 22. CULVERT C. GFC Using Rock Ramp for Upstream Travel.
Click below for picture sequence:
www.mountrolandlandcare.org.au/culverts-gfc-rock-ramp-up

PLATYPUS AND RAKALI AT CULVERT C:

Our baseline monitoring at this culvert shows that a perched culvert makes travel challenging for platypus and rakali.

Platypus:
Before the installation of the rock ramp, no successful upstream passage of platypus through the culvert was recorded and just one platypus was recorded using the culvert for downstream travel. On our camera footage, an obviously well-used bypass track on the bank is visible: this was used by platypus twelve times during our baseline monitoring period for upstream travel. This enabled platypus to exit the waterway and – presumably – to enter it again on the other side of the road.

After the rock ramp installation, platypus used the culvert 10 times for upstream travel and 10 times for downstream travel. There were six bank-bypasses.

Rakali:
During the pre-remediation phase, our cameras showed that rakali used the culvert on four occasions for upstream travel, and twice for downstream travel. A large rakali used the bank bypass once after making a

failed attempt to climb into the culvert.

Following the installation of the rock ramp, rakali used the culvert 33 times (upstream direction 18, downstream direction 15). No bank bypasses were recorded.

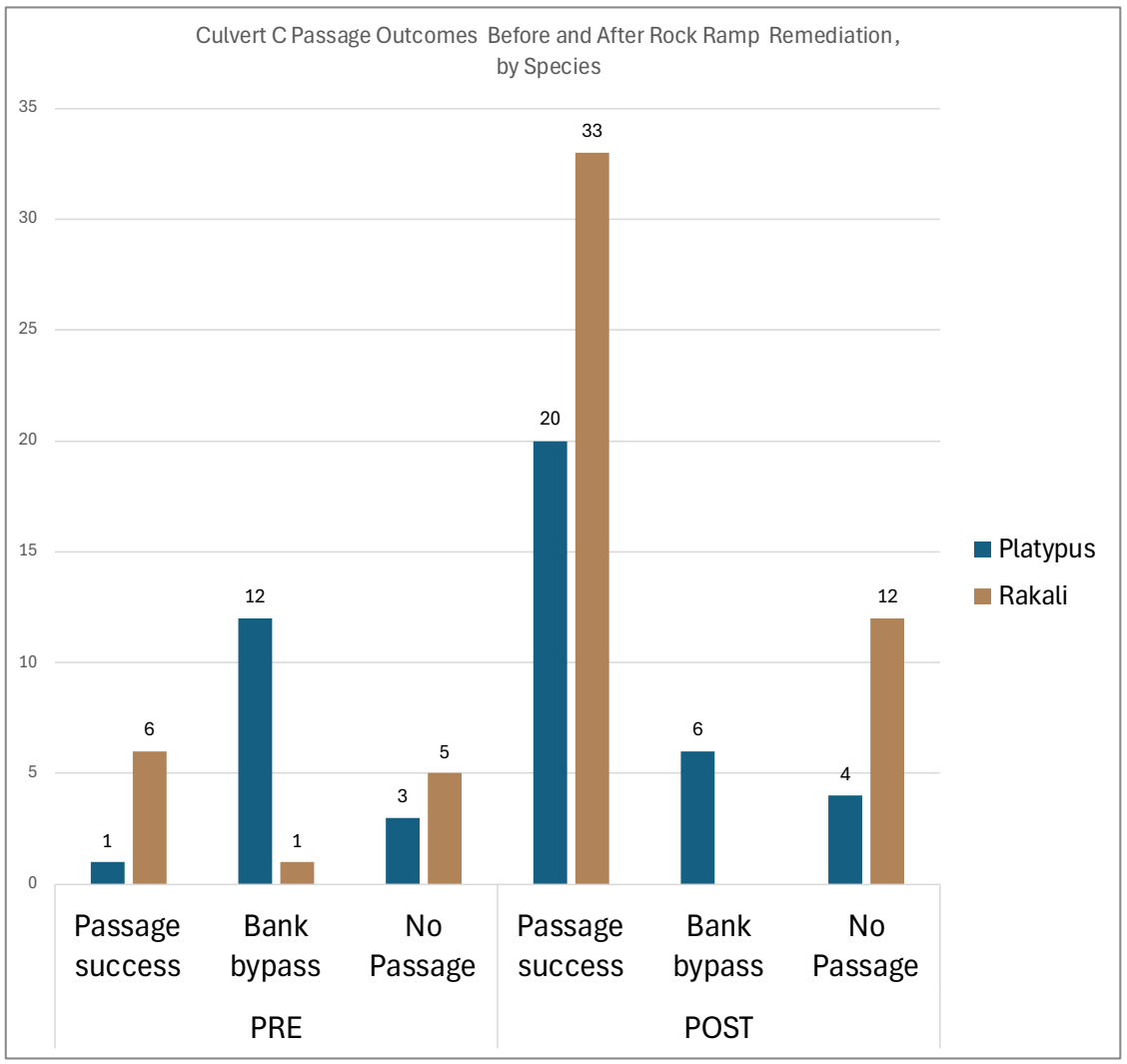


Figure 23. CULVERT C. Platypus and Rakali Passages Before and After Rock Ramp Installation.



Figure 24. CULVERT C. Platypus By-passing Perched Culvert.
Click below for video:
www.mountrolandlandcare.org.au/culverts-platy-bypass-perched-cul-c



Figure 25. CULVERT C. Rakali Unable to Get into Perched Culvert.
Click for video:
www.mountrolandlandcare.org.au/culverts-rakali-fail-perched-culvert



Figure 26. CULVERT C. Platypus Using Rock Ramp.
Click below for video:
www.mountrolandlandcare.org.au/culverts-platy-rock-ramp-up-cul-c

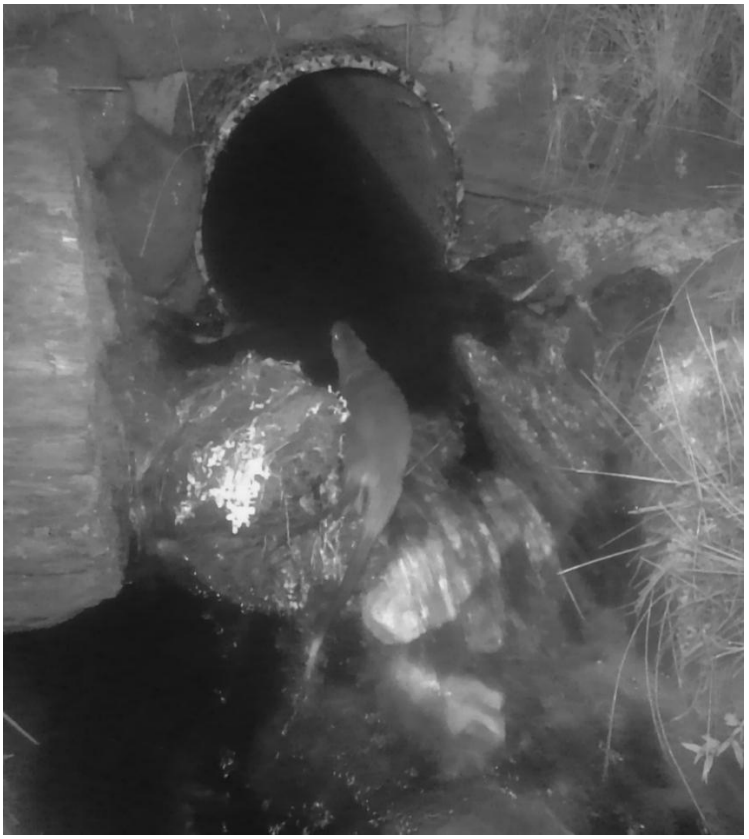


Figure 27. CULVERT C. Rakali Using Rock Ramp.
Click for video:
www.mountrolandlandcare.org.au/culverts-rakali-rock-ramp-up-cul-c

CULVERT D. Existing culvert with perch at outflow.

This existing culvert is located in the same small watercourse as CULVERT C. It is about 500m from the river. The culvert is concrete and round. It has a perch at the outflow of 42cm approx. (Table 1).

Following a baseline monitoring period of 49 days, we installed a ramp of paddock rock using the same method as at CULVERT C.

No GFC were recorded at this culvert either before or after the modifications. However, we recorded many passages and attempted passages of platypus and rakali.



Figure 28. CULVERT D. Before Modifications Showing Perch at Outflow.



Figure 29. CULVERT D. Rock Ramp Modification.

PLATYPUS AND RAKALI AT CULVERT D:

As with CULVERT C, the perch here presented problems to both platypus and rakali. In this case, the greater height of the perch made travel even more difficult for both species.

Upstream travel:

Prior to the installation of the rock ramp, no upstream passages of platypus through the culvert were observed. The distance up to the culvert from the existing rocks below was possibly too great.[6] We recorded some footage where platypus heading in an upstream direction entered a gap in old logs and rocks adjacent to the culvert (Fig. 32). We have no evidence to indicate whether or not this ultimately resulted in successful upstream travel.

Following the installation of the rock ramp, 12 upstream movements of platypus through the culvert were recorded (see Fig. 34 for an example).

On our initial viewing of the footage we had the sense that rakali are more agile than platypus. However, our data show a considerable difference between upstream rakali passages pre-modification and post-modification: two versus 12. Prior to the rock-ramp, rakali were shown using the same bypass as platypus when heading up (Fig. 33). A post rock-ramp example of rakali upstream travel can be seen at Fig. 36. We conclude that remediation of a perched culvert benefits rakali as well as platypus.

Downstream travel:

Before the rock ramp remediation our cameras showed nine occasions of a platypus exiting the culvert onto the rocks below. At times this appeared to be an uncontrolled tumble with the risk of injury (Fig. 31). Following the installation of the rock ramp, the platypus utilized this path on 11 occasions without any apparent difficulty (see Fig. 35 for an example).

Before the rock-ramp was installed, no rakali used the culvert for downstream travel. Our cameras show rakali on the rocks but not actually exiting the culvert. After the culvert was modified, 13 passages of rakali moving out of the culvert and down on the rocks were recorded.

[6] Musser et al. (2024), based on observations in the Jenolan Caves National Park, suggest that platypus are unable to climb successfully where footholds are more than approximately **150 mm (15 cm) apart**, while Otley and le Mar (1998), based on Tasmanian observations, suggest that approximately **300 mm (30 cm)** may represent the maximum vertical distance that can be negotiated in the wild.

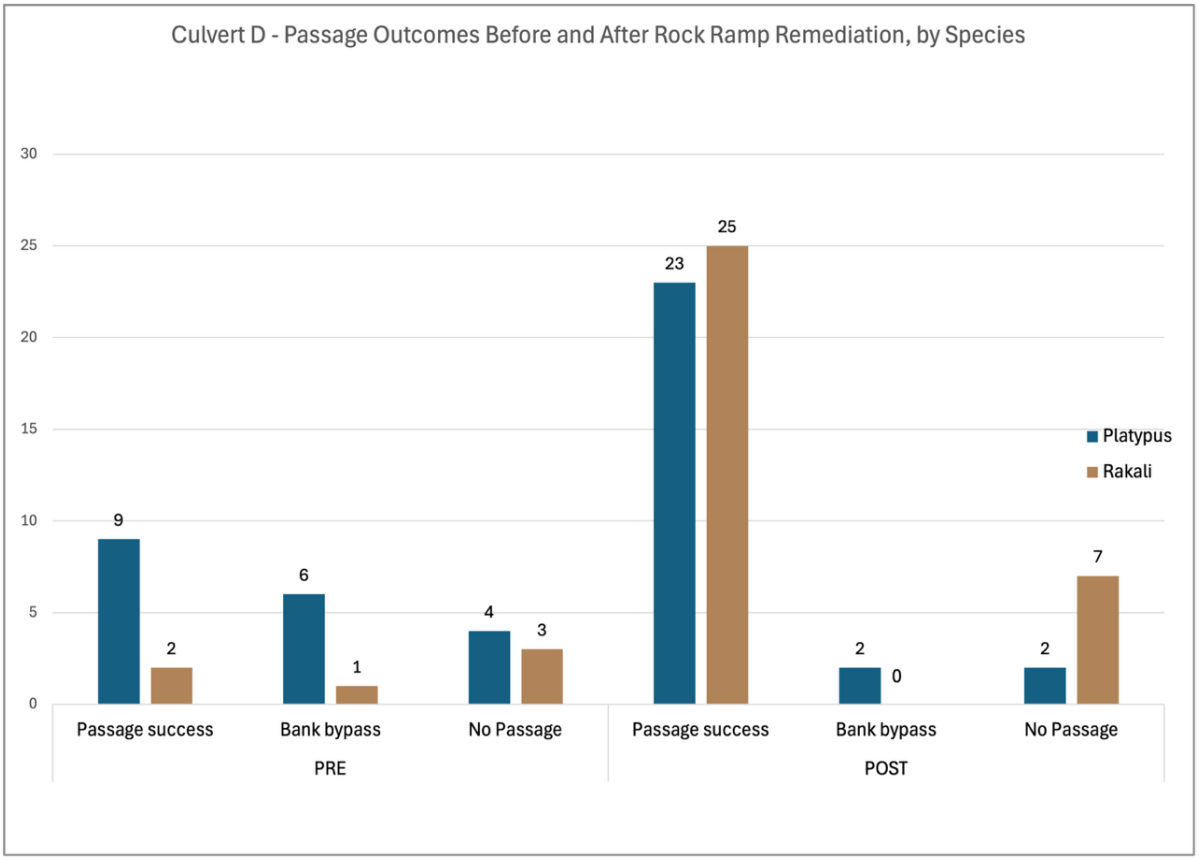


Figure 30. CULVERT D. Passage Outcome Counts.



Figure 31. CULVERT D. Platypus Falling out of Culvert When Heading Downstream.
Click for video:
www.mountrolandlandcare.org.au/culverts-platy-out-perched-culvert



Figure 32. CULVERT D. Platypus By-passing Culvert When Heading Upstream.
Click for video: www.mountrolandlandcare.org.au/culverts-platy-bypass-perched-cul-d



Figure 33. CULVERT D. Rakali By-passing Perched Culvert.
Click for video: www.mountrolandlandcare.org.au/culverts-rakali-bypass-perched-culvert-d



Figure 34. CULVERT D. Platypus using Rock Ramp for Upstream Travel.
Click for video: www.mountrolandlandcare.org.au/culverts-platy-rock-ramp-up-cul-d



Figure 35. CULVERT D. Platypus using Rock Ramp for Downstream Travel.
Click here for video: www.mountrolandlandcare.org.au/culverts-platy-rock-ramp-down-cul-d



Figure 36. CULVERT D. Rakali using Rock Ramp for Upstream Travel.
Click for video:
www.mountrolandlandcare.org.au/culverts-rakali-rock-ramp-up-cul-d

CULVERT E. Existing culvert with perch at outflow.

This culvert was similar to CULVERTS C and D in that it was a perched culvert which we remediated with a rock ramp. However, we only became aware of this culvert after our trials were in process for a time - it was therefore monitored for a short period compared to the other culverts. No GFC were observed at this site. For this report we present before and after pictures of the rock ramp. We did capture some footage of platypus and rakali which is available for use in future publications, but it has not been included in this report's data because the numbers are small.

Before:



After:



WORKS IN THE KENTISH MUNICIPALITY, NORTH-WEST TASMANIA

In this municipality our works have focused on the practicalities of culvert modifications (both installation methods and durability of materials) rather than the monitoring of GFC movements. At these sites, the numbers of known GFC are smaller. The sites are also in a more visible and accessible location. With the exception of Site D, we have chosen against monitoring with remote cameras and scanners because of the risk of equipment theft.

SITE A. Existing Culvert.



Site A is a concrete culvert (length 15m, diam. 1m). It is perched approx. 30cm at the outflow. At this culvert we installed (in 2025) a hemp rope (40 mm diam.) through the culvert. At inflow, the rope is attached to galvanized chain by stainless steel hose clamps, and the chain is attached by galvanized shackle to a star picket driven into the stream bed. The rope extends beyond the culvert at outflow and is tied by hose clamps to an FRP (Fibre Reinforced Plastic) ramp (20cm wide x 50 cm long) inserted under lip of culvert. After 15 months and several flood events, the FRP ramp was intact and unchanged. The hemp rope was still attached but was beginning to break down and to have diminished strength. Following learnings from the Circular Head trials (above), the FRP ramp was removed and replaced with a rock ladder in Aug 2026. We are continuing to monitor this culvert for durability but not at this stage for GFC.

SITE B. Existing Culvert.

Site B is a round concrete culvert (length 7.6m, diam. 1.4m). Here we installed (in 2025) an FRP (Fibre Reinforced Plastic) strip approx. 15cm wide through the culvert. The 2m lengths of FFP were tied together with galvanized chain and tethered at the inflow end by galvanized chain and shackled to a galvanized star picket driven into the stream bed. After 15 months and several flood events, this modification is still in place, with the FRP accumulating grasses and growth.

SITE C. New Culvert. Installed by Kentish Council.

From Michael Mouat, Manager-Operations at Kentish Council:

During the design phase of this project, I advocated for a creative approach rather than sticking to traditional designs. I suggested incorporating a slurry mix within the pipes to foster a more natural environment for wildlife, reducing their reluctance to traverse the area. The designers responded by proposing to oversize the two pipes at a relatively low cost, considering the overall budget. They specified using a 150mm concrete aggregate slurry along the pipes, ensuring a minimum roughened surface of 10mm.

After discussions with Don Thwaites (Kentish Councillor and MRLC Culverts for Wildlife Sub-Committee member), who suggested that we create rest areas for the crayfish (as they tend to move forward and then stop to rest), I instructed the contractor to focus on functionality over aesthetics. We agreed to include dips in the surface for water pooling at intervals. Although the contractors were initially hesitant, believing it would affect the project's appearance, they complied.

The end result is reflected in the photos. I believe that after experiencing a few high-flow events, silt and debris will accumulate in the concrete, enhancing the more natural appearance of the environment and, hopefully, making it more navigable for wildlife. The crayfish should be able to grip the surface more effectively. Additionally, we have designed the entry and exit headwalls with a textured surface to achieve similar benefits.

Some have mentioned that this location may not be ideally suited for this experiment due to the lack of tree cover. However, during construction several locals spoke with the contractors, stating they had observed freshwater crayfish in the area and in the nearby dams on either side of the road. I suggest that further investigation may be warranted. The water flow to the area is via quite a deep channel with long grass etc each side. Midsummer the flow is almost a trickle.

Regardless, it will be beneficial to observe the conceptual design in action and to gather evaluations and feedback from experts in the field to facilitate improvements.

Installation:





After 5 months:



SITE D. New Culvert. Installed by MRLC and Property Owner.

Site D is a new culvert installed on private property. This site is on a small tributary in an upper catchment with largely intact native vegetation. The site was chosen for three reasons. First, because it demonstrates a problem faced by many private landholders – how to effectively and sensitively install a culvert to allow vehicle traffic across a small stream. Second, the site is suitable for monitoring – the landholders are supportive, and the site is private and secure. Third, the site is in an area known to be populated by microchipped GFC.

Two 450mm diam. plastic culverts were installed side by side, one slightly lower than the other (the higher culvert only has flowing water in high rainfall events). Installation was performed in late summer when water flow was low. A small dam held back flowing water for the installation period. One culvert was installed slightly below stream substrate level, and both culverts had rock buttressing and substrate installed to minimize erosion around entry and exit. A road surface comprising Base B gravel was laid over the top, to a depth of at least 10cm.

The site is being monitored for use by wildlife with remote sensor cameras installed at either end. Provision has also been made to install a microchip reader under the outfall end of one culvert. The installation will also be monitored for longevity, with subsequent refinements documented and included in a future publication.

Culverts prior to installation:



Installed culverts:



DISCUSSION

Our trials show that the design of under-road culverts has an impact not only on GFC but also platypus and rakali. If these aquatic animals cannot get into or out of or through a culvert, they have to find another route to continue their travel. This is potentially risky. Many platypus road fatalities have been documented in Tasmania.[7] Fatality figures for GFC are not available.

Fortunately, our trials demonstrate that, in specific contexts, fairly easy and inexpensive solutions are possible.

There are two main considerations for both new culverts and existing culverts. First is the need to avoid a gap ("a perch") between the culvert and the water or stream bed below. This is important for all three species. Second is the need to ensure the culvert base has some roughness or grippy-ness. This is crucial for GFC.

In terms of the **culvert perch**, our Circular Head trials reveal that a perch poses dangers for all three species. Our CULVERT C footage clearly shows a GFC struggling with the drop to the water below. Given that GFC favour cool, stable water and that the camera recorded 38C air temperature (water temperature was not recorded), it is likely that this individual was seeking a cooler environment. The literature indicates that water temperatures above 16C are problematic for GFC, particularly when sustained for long periods of time, and if combined with low oxygen levels.[8] We suggest that in hot weather, culvert barriers such as this might be a threat to GFC survival.

A culvert perch is also difficult for platypus and rakali. The degree of difficulty might vary according to the water flow, the direction of travel, and the height of the perch. At CULVERT D the height of the perch rendered upstream travel impossible for platypus, and downstream travel potentially hazardous.

The extent to which a perched culvert is accessible might vary between the three species. For GFC, as a crawling animal, stream bed continuity is essential. For platypus and rakali, both of whom are excellent swimmers, water level is key. If there is a gap between the culvert and stream bed but water flows are adequate, platypus and rakali should be able to navigate the gap. In times of low water flow, however, the gap - if is large enough - will become a barrier. Based on the camera footage at CULVERT D, there is the potential for physical injury to platypus if falling from a height onto a hard surface below.

[7] Serena et. al. (2025).
[8] Forteath (1985); Walsh & Walsh (2012).

Our trials show that a rock ramp is a good solution for many perched culverts. With CULVERTS C and D, the rock ramp installation had a positive effect on GFC, platypus and rakali travel. The ramps remained in place through several minor floods (CULVERTS C, D, E).

We suggest that when a perch is relatively small (approx. 20cm or less), and the culvert is in a small stream with low velocity flow, carefully placing a few rocks might be sufficient to achieve lasting benefit. When the perch is larger, and water flow and velocity is greater, more complex solutions requiring machinery and more rocks might be required. Depending on the circumstances, expert input from hydrologists, engineers, biologists might also be needed.

The cost of a rock ramp will depend on each situation, including the degree to which the culvert is perched, the volume of water moving though the culvert, the pre-disposition to episodic flooding, and the land tenure. If the culvert is on private land where the owner has a tractor with a bucket and a supply of paddock rock, this is an inexpensive remediation. We estimate that the remediations at CULVERTS C and D each took approximately one hour of work with the tractor plus one hour of manual labour (one person). If the culvert is on public land and/or requires traffic management for the remediation, the costs will be higher.

Rock ramps are not necessarily appropriate for each situation. For example, if a local flood event is likely to be so strong that the rocks will be displaced, an option might be to use larger rocks, or to bind rocks together with cement or in a gabion cage.

There might be other materials which could be used to construct a ramp up to a perched culvert. Further trials might provide further insights.

Our recommendation is that all new culverts should be designed to maintain stream-bed continuity and to avoid perched outlets.

In terms of the **culvert base**, our Circular Head trials demonstrate that rubber mats are a highly effective, GFC-friendly remediation for round, plastic culverts. At CULVERT A, the mats endured over a four-month period through several minor flood events without noticeable deterioration. At CULVERT C, however, where the mats were attached by fencing wire rather than rope, a major flood event resulted in the mats being pushed down by the wire and ‘scrunching up’ at the outflow. We propose that the attachment method needs refining. The mats themselves also require investigation to clarify the longevity of the rubber material in an aquatic

environment. It is possible that other materials will endure longer while providing similar traction. We also suggest that a continuous rubber mat, running the entire length of the culvert, will be much easier to install and maintain.

While we advise caution with the use of FRP as a base, it could still be an option in some circumstances. For instance, if the culvert was a large-diameter round culvert and FRP was laid flat on the bottom with a covering of small gravel, this might be sufficient to allow sufficient traction for travel while avoiding the risk of GFC becoming trapped. Because FRP and the method used to install it have proved enduring, the addition of small gravel may make FRP a viable option for creating a stream-like substrate and restoring traction in culverts. This would need to be established in further trials.

For new, round, plastic culverts, we hope that manufacturers might be able to create a GFC-friendly culvert with a textured, grippy bottom. MRLC is currently discussing this possibility with manufacturers of plastic culverts.

The new culvert installed by Kentish Council (Site D, above) provides an example of a textured base in a concrete culvert. This culvert requires monitoring to establish whether GFC, and other species, will use the modification.

With regard to platypus and rakali, we are unable to say that traction is an issue for these species in the way it clearly is for GFC. Our observations suggest that rakali and platypus *swim* upstream when water levels permit. We have insufficient evidence to determine whether a roughened substrate base alters accessibility when water levels are not high enough for swimming or are too high, or the flow too strong, for comfortable swimming. Further trials might provide this data.

POSSIBLE FUTURE WORKS

A range of possible future works is suggested by our results to date. These include:

Further development of our 'prototype' solutions into real practical solutions that are applicable in a range of situations:

1. Trial the longevity and durability of **culvert modifications**, including

- For rock ramps, explore and test options for stabilizing rocks through floods, including gabion cages, and cementing rocks together.
- For rubber mats, explore options for using a continuous length of material (rather than individual mats), and test options for securing this material in the culvert without creating impediment to water flow.
- For FRP, trial use of FRP with gravel to create an enduring and safe substrate that aids access.

2. Continue to work with manufacturers of **new culverts** – both concrete and plastic - to explore options for the production of a commercially available, off-the-shelf wildlife friendly culvert.

Promotion of current findings:

Promote the findings so far and share with stakeholders. Raise awareness of the barriers posed to wildlife by culverts, and possible solutions. Produce 'prototype' culvert installation guides and 'fact sheets' and make these widely available.

Translation of current findings into on-ground culvert remediation:

- Work with and encourage local farmers and small land-holders in Tasmania to remediate culverts on small waterways with rock ramps and/or traction on the inside of the culvert. Document the process and the results using remote cameras. Use this evidence to promote further, wildlife-friendly culvert modifications.
- Work with and encourage local councils/state government/NRM bodies to identify and remediate high priority culverts in Tasmania.

Analyse the GFC data from the current trials, and gather new data to increase understanding of GFC movement:

- Document the upstream/downstream movements of GFC by sex, time of day, rainfall events, ambient and water temperature. Document the movements of individual GFC using both camera and scanner data.
- Analyze available data sets to document movement patterns for GFC captured more than once.
- Using the methods outlined in this report (in-stream culverts, remote cameras, and microchip readers), conduct further trials to obtain GFC travel data. Whether GFC travel only a few metres or several kilometres in their lives is pertinent to their use of culverts, as the further they travel the more likely they are to encounter a culvert. The extent of this movement is currently unclear. In a previously

published study using radio transmitters attached to the carapace, GFC travelled from .9 to 2.2 km during the monitoring period.[9] It is possible, though, that the radio transmitters themselves affected GFC movement.[10]

- Publish and promote these results.

GFC, platypus and rakali movement through culverts:

Technical field trials to determine the effect of variables such as culvert size, water flow rate, and perch height on GFC, platypus, and rakali travel. Expert engineering input might be required.

Additionally, investigate the issue of traction for platypus and rakali. Is this required for successful passage through a culvert or not? For example, in local flood events (very high water flow/velocity) does a roughened/grippy substrate assist platypus and/or rakali? Conversely, at times of little or no water flow, does a roughened substrate help or hinder progress?

PRESENTATIONS/MEDIA/PUBLICATIONS - to 31 Aug 2026

GFC Statewide Reference Group, Presentation – 12 Feb 2026

Kentish Lions Club, Presentation – 27 Apr 2026

"Helping Tasmania's Freshwater Wildlife Move Safely", MRLC Media Release – May 2026

ABC Northern Tas Radio Interview - 31 May 2026

"Culverts for Crayfish", *Wild* magazine, Issue 199, p. 38 - Autumn 2026

"Enhancing Connectivity and River Health for Giant Freshwater Crayfish (GFC)" Workshop, NRM North, Presentation - 11 Jun 2026.

Kentish Garden Club, Presentation – 13 Aug 2026

"Link, Learn and Lunch", Cradle Coast NRM, Presentation – 13 Aug 2026

Gardens for Wildlife e-bulletin (Tasmanian Land Conservancy)

"Giant Crayfish and Culverts: Keeping Conservation Efforts from Going Down the Drain" by Alastair Richardson, *Crayfish News. The Official Newsletter of the International Association of Astacology* https://www.astacology.org/docs/cn/CrayfishNews_48(1-2)_hr.pdf

Assisting Tasmania's endangered Giant Freshwater Crayfish to cross the road – safely – NRM North. https://api.nrmnorth.org.au/serve-resource/608/ (a summary of MRLC's 2025 work) – June 2026.

GFC Statewide Reference Group, Presentation – 26 Aug 2026

[9] Webb and Richardson (2004).

[10] Personal communication from Todd Walsh.

MRLC Website https://www.mountrolandlandcare.org.au/culverts-for-wildlife-project
MRLC Facebook https://www.facebook.com/mountrolandrivercareinc

Wettenhall Environment Trust Facebook https://www.facebook.com/wettenhallenvironmenttrust

FUTURE PUBLICATIONS

Improving Aquatic Connectivity Through Culvert Remediation: Behavioural Responses of the Tasmanian Giant Freshwater Crayfish, Platypus and Rakali to Experimental Culvert Modifications – forthcoming.

How to Make Your Culverts Wildlife Friendly: A Fact Sheet for Land-Owners

Making Culverts Wildlife Friendly: A Fact Sheet for Road Builders

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FURTHER READING

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Appendix A. Recorded GFC Movements at CULVERT A.

Date	Time	On camera?	Recorded on scanner?	Up or down transit	Note	Sex
11/3	01:02	Y	Y	UP		M
12/3	00:20	Y	Y	UP	GFC spends 22 mins trying to find culvert entry before travelling up	M
13/3	04:35	Y	Y	DOWN		M
14/3	23:05	N	Y		Camera battery ran out	M
15/3	11:00 approx.	N	N	DOWN	No camera or scanner – viewed by two of our volunteers	?
16/3	10:48	Y	Y	DOWN		M
17/3	04:24	Y	Y	DOWN		M
20/3	04:59	Y	Y	UP		M
22/3	12:59	Y	Y	DOWN		M
23/3	21:51	Y	Y	UP		M
24/3	00:40	Y	Y	UP		M
25/3	10:16	Y	Y	?	Fog – can't see anything	M
25/3	15:44	Y	Y	UP	Poor quality vision	M
25/3	23:29	Y	Y	DOWN		M
26/3	00:48	Y	Y	UP		M
26/3	03:43	Y	N	UP	Goes under wire & culvert	
28/3	02:55	Y	Y	UP		M
29/3	03:47	Y	Y	DOWN		M
29/3	04:37	Y	N	?	Single frame, claw only	
30/3	02:28	Y	Y	UP		M
31/3	03:48	Y	Y	UP		M
31/3	16:36	Y	Y	DOWN		M
1/4	03:05	Y	N	UP	V. small GFC. Uses mats successfully.	
1/4	03:18	Y	Y	UP		M
1/4	23:42	Y	Y	DOWN		M
2/4	16:32	Y	Y	DOWN		M
3/4	00:17	Y	Y	DOWN		M
3/4	22:58	Y	Y	UP		M
4/4	06:59	Y	Y	DOWN		M
5/4	06:58	N	Y	DOWN	Daylight savings finished. In daylight GFC not visible on GP.	M
5/4	09:39	Y	Y	UP		M
6/4	04:52	Y	N	UP	GFC trying to go upstream but takes a while to find entry to culvert	
7/4	05:06	Y	Y	DOWN		M
7/4	09:16	N	Y	?	Water v. high -nothing visible on Brinno	M
7/4	09:56	N	Y	?	Water v. high - nothing visible on Brinno	M

7/4	10:07	N	Y	?	Water v. high- nothing visible on Brinno	M
7/4	23:41	Y	Y	UP		M
7/4	12:13	Y	N	UP	Blue GFC. Water high.	
8/4	09:53	Y	Y	UP		M
8/4	10:28	N	y	?	Nothing visible on Brinno	M
8/4	18:55		Y	?	No camera footage (gap between day-time and night-time cameras)	M
8/4	21:43	Y	Y	UP		M
10/4	07:28	Y	Y	DOWN		M
10/4	08:22	N	Y	?	Nothing visible on Brinno – water high	M
11/4	14:31	N	Y	?	Nothing visible on Brinno – water high	M
11/4	21:48	Y	Y	DOWN		M
13/4	08:48	N	Y	UP		M
13/4	18:54	N	Y	?	No camera footage (gap between day-time and night-time cameras)	M
13/4	23:35	Y	Y	UP		M
14/4	07:13	Y	Y	UP		M
14/4	09:55	Y	Y	UP	Blue GFC	M
14/4	10:20	Y	Y	UP		M
14/4	11:26	N	Y	?	Nothing visible on Brinno	M
15/4	01:44	Y	Y	DOWN		M
15/4	22:13	Y	Y	UP	GFC has probs finding culvert entry but eventually succeeds	M
15/4	23:44	Y	Y	UP		M
16/4	06:24	Y	Y	DOWN		M
16/4	15:22	Y	Y	DOWN		M
16/4	18:32	N	Y	?	No camera footage (gap between day-time and night-time cameras)	M
16/4	21:12	Y	Y	DOWN		M
17/4	01:05	Y	Y	DOWN		M
18/4	00:00	Y	Y	UP		M
18/4	03:58	Y	Y	UP		M
18/4	05:14	Y	y	UP		M
18/4	20:26	Y	Y	UP		M
20/4	05:12	N	Y	?	Camera battery ran out	M
20/4	09:37	Y	Y	UP	GFC vivid blue colour	F
21/4	22:11	Y	Y	UP		M
22/4	12:40	Y	Y	DOWN		M
23/4	03:36	Y	Y			M
24/4	10:39	Y	Y	UP		M
24/4	11:02	N	Y	?	Nothing visible on Brinno	M
25/4	01:48	Y	Y			M
25/4	02:00	Y	Y			M
25/4	13:38	Y	Y	DOWN		M
26/4	09:47	Y	Y	UP		M
26/4	12:13	Y	Y	UP		M
27/4	06:12	N	Y	?	Camera battery ran out	M
27/4	06:37	N	Y	?	Camera battery ran out	M

?	?	Y	?	UP	GFC has probs finding culvert entry. Camera dates & times wrong*	
27/4	19:20	Y	Y	UP		M
28/4	00:20	Y	Y	UP		M
28/4	09:26	Y	Y	DOWN		M
28/4	22:27	Y	Y	UP		M
1/5	08:41	Y	N	UP	GFC has blue-ish tinge	
2/5	02:16		Y	?	Camera footage?*	M
2/5	04:13		Y	?	Camera footage?*	M
3/5	08:54	Y	Y	UP	V. foggy – hard to see GFC	M
3/5	13:04	Y	Y	DOWN	V. foggy	M
4/5	07:55	Y	Y	UP	Water high	M
4/5	14:48	Y	N	UP		
4/5	16:21, 16:48	Y	Y	UP		M
4/5	18:02	N	Y		No footage (gap between day-time and night-time cameras)	M
4/5	18:17	N	Y		No footage (gap between day-time and night-time cameras)	M
5/5	01:25		Y		Camera footage?*	M
5/5	02:00		Y		Camera footage?*	M
5/5	11:16	Y	Y	UP	Water high – GFC hard to see	M
?	?	Y	?	UP	Camera dates wrong*	
?	?	Y	?	UP	Camera dates wrong*	
?	?	Y	?	UP	Camera dates wrong*	
5/5	23:52	Y	N	UP		
6/5	09:13	Y	N	UP		
6/5	13:48	Y	N	UP	V. large GFC	
7/5	02:20		Y	?	Camera footage?*	M
7/5	10:23	Y	Y	UP		M
9/5	12:05	Y	N	UP		
9/5	16:23	Y	N	UP		
10/5	02:50		Y	?	Camera footage?*	M
?	?	Y	?	UP	Camera dates wrong*	
?	?	Y	?	DOWN	Camera dates wrong*	
11/5	12:44	Y	Y	UP		M
11/5	13:59	Y	N	UP		
12/5	03:44	Y	Y	UP		M
13/5	18:43	N	y	?	No footage (gap between day-time and night-time cameras)	M
17/5	09:38, 10:04	Y	Y	UP		M
18/5	02:07	N	Y	?	Camera battery ran out	M
18/5	13:39, 13:43	Y	Y	DOWN	Very high water	M
19/5	10:23	Y	N	UP		
					Cameras removed 19/5 due to flood risk	

24/5	18:56		Y	?		M
27/5	21:03		Y	?		M
27/5	21:24		Y	?		M
27/5	23:13		Y	?		M
28/5	00:40		Y	?		F
28/5	02:21		Y	?		M
					Flood 1/6	

Notes:

* In some cases, the camera dates and times are incorrect (due to a failure to sync times after changing the battery). A total of six camera passages cannot be date-matched to eight scanner detections so between zero and six records may be duplicates. The records therefore represent at least 117 and as many as 123 distinct passages.

* We had three cameras in use at CULVERT A: two GardePros for night-time and one Brinno for day-time.

Appendix B. Recorded GFC Movements at CULVERT B.

Date	Time	Recorded on camera?	Recorded on scanner?	Up or down transit	Note	Sex
16/3	03:10 03:12 03:21	Y Y Y	N N N	DOWN UP UP	GFC outside of mesh and culvert in these 3 passages	
20/3	02:36	Y	N	UP		
20/3	04:24	Y	Y	DOWN		M
20/3	20:22	N	Y	?	Camera battery ran out	M
24/3	04:09	Y	N		GFC goes half-way up then backs down	
24/3	04:18	Y	N	UP	Could be same individual as above?	
24/3	23:04	Y	N		GFC doesn't enter culvert	
25/3	03:03	Y	N		GFC comes down half-way then goes back	
26/3	00:31	Y	N	DOWN	GFC turns around at one point but then continues down	
27/3	01:19	Y	Y	DOWN		M
27/3	22:22	Y	N	UP	GFC a bit hesitant to go into culvert but does eventually	
27/3	23:39	Y	N	DOWN		
28/3	03:46	Y	Y	UP	Two GFC trying to enter culvert at same time! One eventually does but travels slowly up.	M
1/4	05:07	Y	Y	DOWN		M

2/4	00:01	Y	N	UP	GFC trying to go up but does not enter culvert	
2/4	04:11	Y	N		GFC outside mesh, trying to go up	
2/4	07:05	Y	N	UP	Low light – footage quality poor. GFC takes 4 min. 27 sec.to complete passage.	
4/4	02:15	Y	N	UP		
4/4	03:23	Y	Y	DOWN		M
4/4	08:05	Y	N		GFC goes half-way up culvert and then backs out. Travels along mesh, trying to get through before going back down-stream.	
5/4	02:34	Y	N		GFC trying to go up but not entering culvert	
5/4	02:57	Y	N		GFC trying to go up? … through mesh … then going down	
6/4	00:08	Y	N		GFC trying to go up but not entering culvert	
6/4	02:29	Y	N	DOWN		
					Culvert removed 6/4 due to flood risk	

Appendix C. Recorded GFC Movements at CULVERT C.

Date	Time	On camera?	Recorded on scanner?	Up or down transit	Note	Sex
23/2	13:59	Y	Scanner not in place	DOWN	Large GFC trying to travel down but having problems with perched culvert.	
					Rock ramp installed 30/3	
21/4	10:22	Y	Y	DOWN		M
25/4	11:34	Y	N	UP		
					Removed cameras and scanners 10/5 due to flood risk	

Appendix D. Camera and Scanner Technology.

Cameras:

In our Circular Head trials (monitoring up to five culverts at any time) we used eight GardePro E9PCF remote infrared trail cameras and two Brinno TLC 300 cameras in varying combinations.

After a period of trialing and experimentation, we discovered that the camera configuration required for capturing GFC (ectothermic animals) was:

a. GardePro cameras during the night – time lapse (not motion detection) mode

b. Brinno time lapse cameras during the day.

The required use of time lapse mode with GardePro cameras taxed the supplied batteries, requiring frequent visits (at least once every seven-ten days) to the Circular Head remote site. There was also additional footage viewing time compared to motion detection mode.

For platypus and rakali (endothermic animals, mostly active at night), the GardePro cameras in motion detection mode worked well. We programmed the cameras to take a picture and a short video after each trigger. Footage review was straight-forward although still time-consuming.

We investigated AI options for footage review but as of May-June 2026 nothing was available.

Scanners:

In order to detect previously microchipped GFC we used equipment supplied by Microchips Australia. At CULVERT A and CULVERT B (then later for a short time at CULVERT C) we installed an Antenna (ANT-612 IP68) underneath the culvert and an MC Stationary OEM Decoder (LID650) on the riverbank. Power was supplied by a solar panel kit.

We are happy to supply full technical details of cameras and scanners on request.

Appendix E. Glossary of Technical Terms and Acronyms.

Composite Culvert – a culvert manufactured with two or more materials.

FRP – Fibre Reinforced Plastic. Also known as Fibre Reinforced Polymer.

IUCN – International Union for the Conservation of Nature.

Perched Culvert – a culvert where at the water outflow there is a gap between the bottom of the culvert and the water or stream bed below. In this report we have measured the perch as the distance between the bottom of the culvert and the bed of the watercourse because that measurement is crucial to the crawling GFC. For creatures that swim – platypus, rakali, fish – the crucial perch measurement is that from the bottom lip of the culvert to the surface of the water below.