

3.2.5 Carter's freshwater mussel

A complete list of Carter's freshwater mussel records and locations from the current study are provided in Appendix C. No Carter's freshwater mussels were recorded from the Helena River within the Survey Area, despite extensive searching, including thorough exploration within the 13 quadrats and along the banks and further in-stream up to wadeable depth.

Two live Carter's freshwater mussels were recorded from Wetland West, within the same quadrat (Quadrat 4), located on the north-eastern end of the wetland. The individuals were both mature specimens, measuring 65 and 69 mm ML. Three dead specimens (i.e., empty shells) were also found within this quadrat. No other live individuals were recorded in the remaining 12 quadrats, or during opportunistic searches throughout Wetland West. Evidence of a mussel shell was recorded in Quadrat 13 on the western end of the wetland, though no live individuals were recorded from this location.

A total of 46 live Carter's freshwater mussels were recorded from Wetland East, the wetland previously known to support Carter's freshwater mussel. Of the ten quadrats undertaken within this site, live mussels were recorded from four (Quadrats 2, 3, 8 and 9). Opportunistic records were also made whilst hand searching. Size of individuals from Wetland East ranged from 48 mm to 87 mm ML. Examination of size classes indicated that the population structure consists exclusively of mature specimens, with no juveniles recorded (Figure 3.7). The highest number of individuals recorded in one quadrat was 19 (from Quadrat 2), followed by 17 individuals (from Quadrat 3).

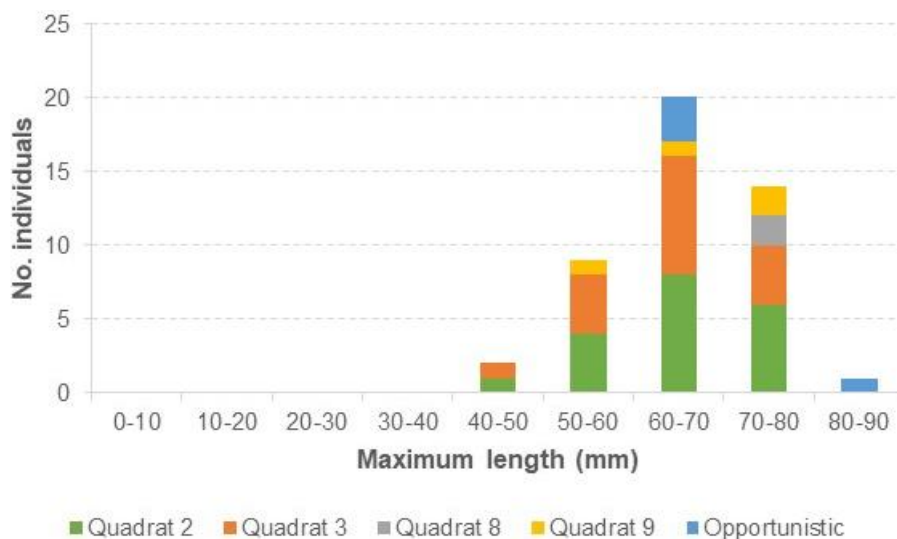


Figure 3.7: Size class structure of Carter's freshwater mussels recorded from Wetland East.

Population densities were calculated for each wetland where Carter's freshwater mussels were recorded. Densities were based on the number of individuals found and the size of the search area within each wetland, which was estimated using satellite aerials (Table 3.4). Population density was 0.004 per m² at Wetland West and 0.095 per m² at Wetland East. Population extents are shown in Figure 3.8.

406800

407000

407200

407400

6469600

6469600

6469400

6469400



Legend

Survey Area

State Road

Surface Hydrology

Minor

Major

Indicative Mussel Density

1

2

3

4

>5

biologic
Environmental Survey

Scale: 1:2,000

0 30 60 90 Meters

Coordinate System: GDA2020 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA2020 Created 23/11/2022



MAIN ROADS WA
Great Eastern Highway Bypass Interchanges Project: Targeted Carter's Freshwater Mussel Survey

Figure 3.8: Mussel density within the Survey Area

Table 3.4: Estimated population densities of Carter's freshwater mussel based on survey results.

Site	Area (m ²)	No. live mussels	Density of live mussels (number/ m ²)
Wetland West	551	2	0.004
Wetland East	485	46	0.095

3.2.6 Other aquatic fauna

Other aquatic fauna were observed within the Survey Area, indicating suitable habitat conditions with which to support fauna. A native crayfish, the gilgie (*Cherax quinquecarinatus*) was recorded amongst LWD within the Helena River (Plate 3.1). The gilgie was female, measuring 60 mm in carapace length. Two fish species were observed in Wetland East; the native western pygmy perch (*Nannoperca vittata*) and the introduced common carp (*Cyprinus carpio*). The carp observed at Wetland East was approximately 1 m in length, indicating a mature specimen that has likely been there for some time (Plate 3.1).

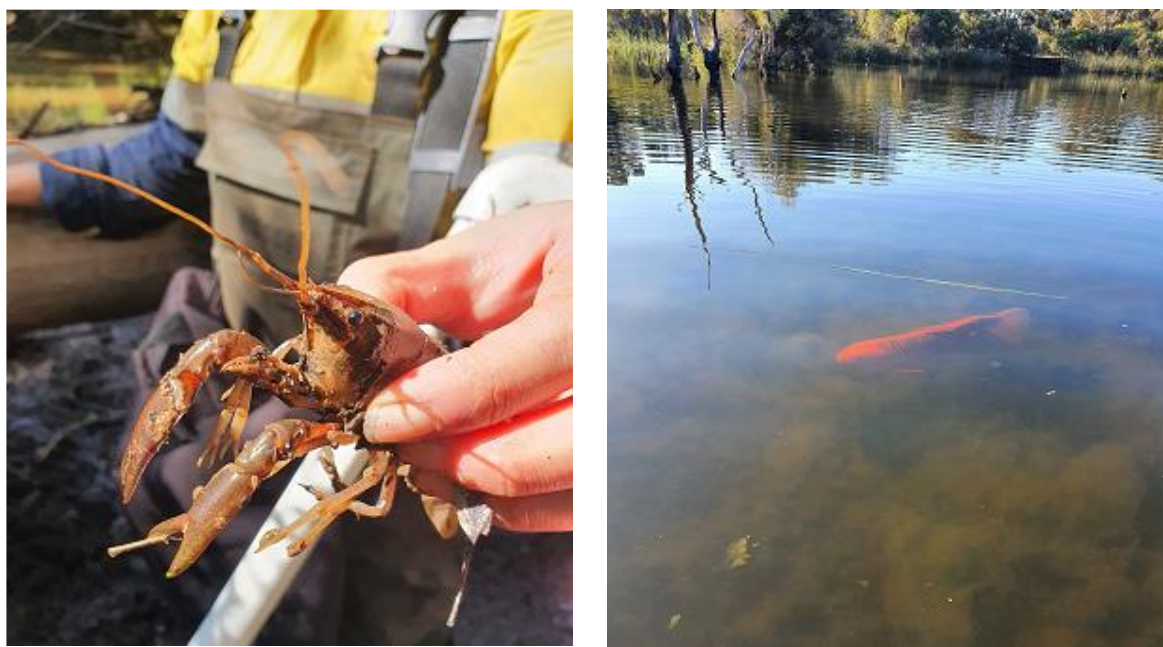


Plate 3.1: A native gilgie from Helena River (left), and introduced carp from Wetland East (right).

3.2.7 Reassessment of likelihood of occurrence

Each site within the Survey Area was reassessed for likelihood of occurrence. The Helena River within the Survey Area was reassessed, and likelihood of occurrence downgraded from Highly Likely to Unlikely (Table 3.5). This assessment was based on the lack of Carter's freshwater mussel recorded despite extensive search effort. While water quality conditions and sediment composition (across the majority of the reach sampled) were considered suitable at time of sampling, the fact that this section of the river dries out precludes Carter's freshwater mussel because they require permanent water. The presence of terrestrial grasses throughout this reach of the Helena River provides evidence that this

section dries out over summer, with no permanent pools remaining. The terrestrial grass likely moved into the creek bed when the river was dry, but sediments still waterlogged, and now persists because inundation events are not sufficiently long to completely kill it off, with recolonising events occurring again in summer. The lack of sedges such as *Machaerina articulata* in this reach also indicates that there are no permanent pools present.

At Wetland West and Wetland East, the likelihood of occurrence was reassessed to Confirmed, based on the presence of live Carter's freshwater mussels at the time of the survey.

Table 3.5: Survey summary and reassessment of likelihood of occurrence of Carter's freshwater mussel based on survey results.

Sites	Within Current Known Distribution	Suitable Water Quality Within Survey Area	Potential Habitat Within Survey Area	Recorded Within Survey Area	Likelihood of Occurrence
Helena River	Yes	Yes	No	No	Unlikely
Wetland West	Yes	Yes	Yes	Yes	Confirmed
Wetland East	Yes	Yes	Yes	Yes	Confirmed

4 DISCUSSION

4.1 Distribution, density, and abundance of Carter's freshwater mussels

Carter's freshwater mussels have specific habitat and water quality requirements. Ma (2018) noted that in-stream mussel distribution was negatively correlated with distance to riverbank and water velocity, and positively correlated with debris and vegetation cover. This means that mussels occur in slow-flowing waters where debris is able to build up. They also require a medium-grain substrate for ease in burrowing, as well as vegetative cover for protection from sunlight (Ma, 2018). Shade provided by riparian vegetation can significantly reduce mortality rates of Carter's freshwater mussel (Lymbery *et al.*, 2020). Riparian vegetation also provides complex microhabitats in-stream, such as leaf litter and large woody debris which support food sources for Carter's freshwater mussel, as well as protection from high flows (Ma, 2018), and predators (Klunzinger, 2012). Carter's freshwater mussel occurs exclusively in perennial water bodies (Klunzinger, 2012).

No Carter's freshwater mussels were recorded within the Helena River, in the Survey Area, despite water quality conditions (including salinity) being within the tolerance range for this species, and substrates being suitable in some sections of the reach. The absence of mussels is due to the lack of permanent water within this section of the Helena River, as indicated by the high coverage of terrestrial grasses observed across the riverbed at the time of survey, and lack of sedges such as *Machaerina articulata*. Permanent pools do persist within ephemeral rivers, which provide refugia for various types of aquatic fauna, including Carter's freshwater mussel. Records of Carter's freshwater mussel are known from other locations on the Helena River, where permanent pools exist, including sites near the

Pipehead Dam (Klunzinger *et al.*, 2011), and a pool approximately 4.9 km downstream of the Survey Area (2014 record) (DBCA, 2020). However, the lack of permanent water within the Survey Area reach means that Carter's freshwater mussel cannot persist there.

Carter's freshwater mussels were recorded in both Wetland West and Wetland East. At Wetland West, only two live individuals were recorded, despite extensive searching, while 46 individuals were recorded at Wetland East. Substrate types (i.e., a mix of clay and sand) were generally similar in both wetlands, although some sections of Wetland West were covered in a soft, anoxic layer or comprised bedrock substrate, both of which preclude Carter's freshwater mussels. The south-western edge of Wetland West was unable to be successfully searched or assessed for suitable habitat due to the steep banks and high water depth in this area. Additional searches would not likely locate many more specimens, however, given the high level of survey effort throughout the rest of the wetland. Wetland West was more acidic than Wetland East or the Helena River, with pH in the north-western section being particularly low (pH 3.94). pH ranged from this low value (3.94 at Quadrat 11) to 6.49 (Quadrat 1), with the location where mussels were recorded having a pH of 5.10. Although pH is not thought to affect Carter's freshwater mussel to the same extent as other factors such as salinity, turbidity, and the availability of permanent surface water (Klunzinger, 2012), freshwater mussels are known to be sensitive to low pH (Strayer, 2008). Klunzinger *et al.* (2015) reported records of Carter's mussels from habitats ranging from pH 4.24 to 9.7, suggesting mussels can survive within this range. Therefore, the more acidic pH recorded from the north-western section of Wetland West may be outside the acceptable limits for Carter's freshwater mussel. As a result, it is possible that some sections of Wetland West are not suitable for Carter's freshwater mussel, influencing the distribution of mussels within this wetland. Also, the current survey measured in situ water quality only, and there may be other water quality factors (such as ammonia or other pollutants) that may be influencing population size and density within Wetland West.

Connectivity between the wetlands and Helena River, facilitated by the adjacent floodplain and drainage lines, is also important. There appears to be connectivity between the wetlands and the river currently during high rainfall and flooding events. At the time of the survey, sections between the wetlands and the river were still inundated. Both native and introduced fish were observed in Wetland East at the time of survey, though fish were not observed at Wetland West. Fish are essential to the lifecycle of Carter's freshwater mussel, as they act as a host for glochidia (the larval stage of freshwater mussels) and are necessary for this species' dispersal (Klunzinger, 2012). Any changes to the connectivity of the Helena River with adjacent wetlands would impact the ability of aquatic fauna (including Carter's freshwater mussel) to colonise these areas in future.

No juveniles were recorded despite extensive searching. Juvenile mussels are difficult to find in nature, given their relatively short time span within this life history stage relative to their life, coupled with the fact that juveniles are thought to burrow slightly deeper than adults (Ma, 2018). A Carter's freshwater mussel is considered juvenile if they are below 27 mm. This is still relatively large, and hand searching should pick them up assuming they are not buried too deep within the substrate. Reductions in recruitment and an ageing population for such a long-lived species could result in long-term population

losses (Klunzinger *et al.*, 2014), which may not become evident for some time. It is unclear from the current survey whether lack of juveniles recorded is indicative of the absence of juveniles, a reduction in recruitment, or simply an artefact of juveniles being difficult to detect in nature.

4.2 Importance of recorded populations

The Carter's freshwater mussel records from the current survey at Wetland West represent additional records of this conservation significant species within its known distribution. These confirmed records are considered important for a species experiencing population decline and reduction in available habitat. Presence of live mussels at Wetland East confirm that this wetland continues to support the conservation significant species, with abundances recorded from the north-western section of the wetland being relatively high compared to previous surveys undertaken by the authors on behalf of Main Roads (Biologic, 2020, 2021). As the Healthy Rivers database only indicates presence/absence data for Carter's freshwater mussel (DWER, 2022), conclusions regarding population trends over time within the wetland cannot be made.

It is not known whether this reach of the Helena River supported this species historically, although, the Healthy Rivers database indicates that there are no records of Carter's freshwater mussel from two survey sites immediately downstream of the Roe Highway bridge (within the current Survey Area) (DWER, 2022). Additional information about these sites could not be obtained from either DWER or DPIRD due to limitations in their databases (Chris Bird, DPIRD, pers. comms.), so there is no information available about when these sites were surveyed, or the type of survey undertaken. Two other sites sampled by DWER on the Helena River system (one location near Whiteman Road ~1.2 km downstream of the Survey Area, and one below Mundaring Weir, ~13 km east of the Survey Area) also found no Carter's freshwater mussel to be present at time of sampling (Kelli O'Neill, Healthy Rivers team, pers. comms.); however, there are records between these locations (see Figure 3.1). The distribution of Carter's freshwater mussel within the Helena River system is patchy, with records restricted to permanent pools, which is not surprising for an ephemeral system. Records of Carter's freshwater mussel from 2014, further downstream and outside of the Survey Area (see Figure 3.1) indicate that this system may still be able to support such conservation significant species, where permanent water is present. Drying climate leading to reduction of permanent water and salinisation of freshwater systems have been identified as the biggest threats to Carter's freshwater mussel (Klunzinger, 2012). Therefore, the persistence of, and connectivity to, adjacent permanent water bodies where Carter's freshwater mussel can persist, are becoming increasingly important to the maintenance of biodiversity in the system.

Notably, the recent redescription of Carter's freshwater mussel has reduced its current range (Klunzinger & Kirkendale, 2022). As a species already listed as Vulnerable (BC Act, EPBC Act, IUCN) and experiencing population decline, this reduction has implications for the conservation status of this species. The importance of existing populations is likely to become more significant following the reassessment of this species.

4.3 Conclusion

This survey represents the second Carter's freshwater mussel survey of the NVCP application area. Extensive survey of the Helena River within the NVCP application area was undertaken, but no Carter's freshwater mussels were located. However, 46 Carter's freshwater mussels were recorded in Wetland East and two Carter's freshwater mussels were recorded in Wetland West, adjacent to the proposed clearing area.

Although known from elsewhere on the Helena River, the lack of permanent surface water in this reach would preclude the presence of Carter's freshwater mussel here. Based on this, it is considered unlikely that this species would be able to recolonise this part of the Helena River, though this area would be important for passage of host fish and/or larval forms of mussels when seasonally inundated.

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APPENDICES

Appendix A: Conservation status codes

International Union for Conservation of Nature

Category	Definition
Extinct (EX)	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Extinct in the Wild (EW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Critically Endangered (CR)	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future
Data Deficient (DD)	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases, great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

Environment Protection and Biodiversity Conservation Act 1999

Category	Definition
Extinct (EX)	Taxa not definitely located in the wild during the past 50 years.
Extinct in the Wild (EW)	Taxa known to survive only in captivity.
Critically Endangered (CE)	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
Endangered (EN)	Taxa facing a very high risk of extinction in the wild in the near future.
Vulnerable (VU)	Taxa facing a high risk of extinction in the wild in the medium-term future.
Migratory (MG)	Consists of species listed under the following International Conventions: Japan-Australia Migratory Bird Agreement (JAMBA) China-Australia Migratory Bird Agreement (CAMBA) Convention on the Conservation of Migratory Species of Wild animals (Bonn Convention)

Biodiversity Conservation Act 2016

Category	Definition
CR	Rare or likely to become extinct, as <i>critically endangered</i> fauna.
EN	Rare or likely to become extinct, as <i>endangered</i> fauna.
VU	Rare or likely to become extinct, as <i>vulnerable</i> fauna.
EX	Being fauna that is presumed to be extinct.
MI	Birds that are subject to international agreements relating to the protection of migratory birds.
CD	Special conservation need being species dependent on ongoing conservation intervention. (Conservation Dependant)
OS	In need of special protection, otherwise than for the reasons pertaining to Schedule 1 through to Schedule 6 Fauna. (Other specially protected species)

Department of Biodiversity, Conservation and Attractions Priority codes

Category	Definition
Priority 1 (P1)	Taxa with few, poorly known populations on threatened lands.
Priority 2 (P2)	Taxa with few, poorly known populations on conservation lands; or taxa with several, poorly known populations not on conservation lands.
Priority 3 (P3)	Taxa with several, poorly known populations, some on conservation lands.
Priority 4 (P4)	Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection but could be if present circumstances change.

Appendix B: Default ANZECC/ARMCANZ (2000) water quality guidelines.

Default trigger values for some physical and chemical stressors for south-west Australia for slightly disturbed ecosystems (TP = total phosphorus; FRP = filterable reactive phosphorus; TN = total nitrogen; NOx = total nitrates/nitrites; NH₄⁺ = ammonium). Data derived from trigger values supplied by Western Australia (ANZECC/ARMCANZ 2000).

Aquatic Ecosystem	Analyte						
	TP mg/L	FRP mg/L	TN mg/L	NOx mg/L	NH ₄ ⁺ mg/L	DO % saturation ⁱ	pH
Upland River ^f	0.02	0.010	0.45	0.20	0.06	90-na	6.5-8.0
Lowland River ^f	0.06	0.040	1.20	0.15	0.08	80-120	6.5-8.0
Lakes & Reservoirs	0.01	0.005	0.35	0.01	0.01	90-no data	6.5-8.0
Wetlands ^d	0.06	0.030	1.50	0.10	0.04	90-120	7.0 ^e -8.5 ^e

na = not applicable;

e = in highly coloured wetlands (gilven >52 g_{440m}⁻¹) pH typically ranges 4.5-6.5;

f = all values derived during base river flow conditions not storm events;

i = dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability.

Default trigger values for salinity and turbidity for the protection of aquatic ecosystems, applicable to indicative of slightly disturbed ecosystems in south-west Australia (ANZECC/ARMCANZ 2000).

Salinity	(µs/cm)	Comments
Aquatic Ecosystem		
Upland & lowland rivers	120-300	Conductivity in upland streams will vary depending on catchment geology. Values at the lower end of the range are typically found in upland rivers, with higher values found in lowland rivers. Lower conductivity values are often observed following seasonal rainfall.
Lakes, reservoirs & wetlands	300-1,500	Values at the lower end of the range are observed during seasonal rainfall events. Values even higher than 1,500 µScm ⁻¹ are often found in saltwater lakes and marshes. Wetlands typically have conductivity values in the range of 500-1,500 µScm ⁻¹ over winter. Higher values (>3,000 µScm ⁻¹) are often measured in wetlands in summer due to evaporative water loss.
Turbidity	(NTU)	
Aquatic Ecosystem		
Upland & lowland rivers	10-20	Turbidity and SPM are highly variable and dependant on seasonal rainfall runoff. These values representative of base river flow in lowland rivers.
Lakes, reservoirs & wetlands	10-100	Most deep lakes have low turbidity. However, shallow lakes have higher turbidity naturally due to wind-induced re-suspension of sediments. Wetlands vary greatly in turbidity depending on the general condition of the catchment, recent flow events and the water level in the wetland.

Appendix C: Survey records of Carter's freshwater mussel (*Westralunio carteri*).

Site ID	Latitude	Longitude	ML (mm)	MW (mm)	Observations
Wetland West Q4	-31.9067	116.0151	69	42	
Wetland West Q4	-31.9067	116.0151	65	41	
Wetland West Q4	-31.9067	116.0151			Three empty shells; not live
Wetland West Q13	-31.9069	116.0142			Empty shell; not live
Wetland East Q2	-31.9065	116.0183	77	45	
Wetland East Q2	-31.9065	116.0183	77	45	
Wetland East Q2	-31.9065	116.0183	80	47	
Wetland East Q2	-31.9065	116.0183	73	45	
Wetland East Q2	-31.9065	116.0183	66	40	
Wetland East Q2	-31.9065	116.0183	69	41	
Wetland East Q2	-31.9065	116.0183	69	40	
Wetland East Q2	-31.9065	116.0183	71	43	
Wetland East Q2	-31.9065	116.0183	55	33	
Wetland East Q2	-31.9065	116.0183	68	40	
Wetland East Q2	-31.9065	116.0183	76	44	
Wetland East Q2	-31.9065	116.0183	65	37	
Wetland East Q2	-31.9065	116.0183	53	33	
Wetland East Q2	-31.9065	116.0183	62	37	
Wetland East Q2	-31.9065	116.0183	64	36	
Wetland East Q2	-31.9065	116.0183	62	37	
Wetland East Q2	-31.9065	116.0183	55	32	
Wetland East Q2	-31.9065	116.0183	54	33	
Wetland East Q2	-31.9065	116.0183	48	30	
Wetland East Q3	-31.9065	116.0183	66	38	
Wetland East Q3	-31.9065	116.0183	68	40	
Wetland East Q3	-31.9065	116.0183	66	40	
Wetland East Q3	-31.9065	116.0183	79	46	
Wetland East Q3	-31.9065	116.0183	75	46	
Wetland East Q3	-31.9065	116.0183	75	45	
Wetland East Q3	-31.9065	116.0183	74	43	
Wetland East Q3	-31.9065	116.0183	66	40	
Wetland East Q3	-31.9065	116.0183	64	39	
Wetland East Q3	-31.9065	116.0183	56	34	
Wetland East Q3	-31.9065	116.0183	63	36	
Wetland East Q3	-31.9065	116.0183	56	34	
Wetland East Q3	-31.9065	116.0183	62	38	
Wetland East Q3	-31.9065	116.0183	59	36	
Wetland East Q3	-31.9065	116.0183	69	38	
Wetland East Q3	-31.9065	116.0183	52	31	
Wetland East Q3	-31.9065	116.0183	49	29	
Wetland East Q8	-31.907	116.0186	71	45	
Wetland East Q8	-31.907	116.0186	75	43	
Wetland East Q9	-31.9065	116.0186	77	45	
Wetland East Q9	-31.9065	116.0186	76	44	

Site ID	Latitude	Longitude	ML (mm)	MW (mm)	Observations
Wetland East Q9	-31.9065	116.0186	65	37	
Wetland East Q9	-31.9065	116.0186	60	36	
Wetland East OP1	-31.9064	116.0182	66	44	
Wetland East OP2	-31.907	116.0186	87	52	
Wetland East OP2	-31.907	116.0186	70	39	
Wetland East OP2	-31.907	116.0186	64	37	

Appendix D: Section 40 Threatened Fauna Authorisation.



Department of Biodiversity,
Conservation and Attractions

AUTHORISATION TO TAKE OR DISTURB THREATENED SPECIES

Section 40 of the Biodiversity Conservation Act 2016

AUTHORISATION DETAILS

Authorisation number: TFA 2223-0045

Authorisation duration: From date signed by Minister's delegate below until 31 July 2023.

AUTHORISATION HOLDER

Jessica Delaney

Principal Zoologist and Manager of Aquatic Ecology

Biologic Environmental Survey

24-26 Wickham Street

East Perth WA 6004

AREA TO WHICH THIS AUTHORISATION APPLIES

Upstream and downstream of Roe Highway in the Helena River, and nearby wetlands (Swan Region).

AUTHORISED ACTIVITY

Purpose of taking/disturbance:

Undertake a targeted survey for Carter's freshwater mussels for Main Roads Western Australia to determine mussel presence in an area targeted for future roadworks.

Threatened species authorised to be taken/disturbed (including conservation status):

Carter's freshwater mussel, *Westralunio carteri* (Vulnerable)

Quantity of threatened species authorised to be taken/disturbed:

Any number of individual animals of the above listed threatened fauna species may be captured and released and/or disturbed during the targeted survey.

Authorised taking/disturbance methodology:

Take Carter's freshwater mussels by hand (foraging), dip net (2mm mesh) and mussel rake during targeted searches. Up to ten (10) quadrats (1m²) will be deployed per site in suitable habitat and within two metres of the shoreline.

Captured mussels will have shell length and width measured to the nearest 1 mm, before immediate release at the capture site.

Dates within which taking/disturbance authorised:

From date signed by Minister's Delegate below until 31 July 2023.

Authorisation to take or disturb threatened species

Authorisation number: TFA 2223-0045

AUTHORISED PERSONS

Jessica Delaney	Kim Nguyen	Alex Riemer
Siobhan Paget	Morgan Lythe	

Additional personnel who are suitably qualified and experienced in the Authorised Activities working under the direction of the Authorisation Holder.

Field assistants assisting working under the direct supervision of the Authorisation Holder or suitably qualified and experienced named Authorised Persons.

CONDITIONS

1. The written authorisation of the person in possession or occupation of the land accessed and upon which threatened fauna is taken or disturbed must:
 - a. state location details (including lot or location number, street/road, suburb and local government authority);
 - b. state land owner or occupier name, and contact phone number;
 - c. specify the time period that the authorisation is valid for;
 - d. be signed and dated; and
 - e. be attached to this Authorisation to take or disturb threatened species at all times.
2. This Authorisation to take or disturb threatened species, and any other written authorisation or lawful authority which authorises the take or disturbance of fauna on specified locations for the Authorised Activities must be carried at all times while conducting Authorised Activities and be produced on demand by a wildlife officer.
3. Authorised Persons who are not suitably qualified and experienced in the Authorised Activities, and field assistants assisting with the Authorised Activities, must be working under direct supervision of experienced and competent named Authorised Persons.
4. Any inadvertently captured species of non-target threatened fauna or non-threatened fauna (threatened fauna as defined in *Biodiversity Conservation Act 2016* Section 19) is to be released immediately at the point of capture. Details of such fauna must be included in the fauna taking/disturbance return as required under this Authorisation.
5. The Authorisation Holder, unless specified in the Authorised Activities, must not:
 - a. release any threatened fauna in any area where it does not naturally occur;
 - b. transfer threatened fauna to any other person or authority (other than the Western Australian Museum) unless the fauna is injured or abandoned fauna (condition 6); or
 - c. dispose of the remains of threatened fauna in any manner likely to confuse the natural or present-day distribution of the species.
6. All threatened fauna injuries, unexpected deaths, unplanned euthanasia, and abandoned young or eggs, must be reported by the Authorisation Holder to the DBCA Wildlife Protection Branch, Wildlife Licensing Section (wildlifelicensing@dbca.wa.gov.au) to notify of the incident and for advice on treatment or disposal. All deceased threatened fauna must be offered to the Western Australian Museum.
7. The Authorisation Holder must create, compile and maintain records and information as required in a DBCA approved "Return of Fauna Taken/Disturbed" of all fauna taking/disturbance activities as they occur.
8. A DBCA approved "Return of Fauna Taken/Disturbed" must be completed in full (including nil taking/disturbance details) and submitted to DBCA Wildlife Licensing Section

Authorisation to take or disturb threatened species

Authorisation number: TFA 2223-0045

(wildlifelicencing@dbca.wa.gov.au) prior to the end of the Authorisation duration and, if the Authorisation duration is greater than 12 months, prior to the end of each annual period of the Authorisation (from the date signed by the Minister's delegate) (refer to "Additional Information" section below). Where a licence to take or disturb fauna is issued in conjunction with this Authorisation to take or disturb threatened species, a combined "Return of Fauna Taken/Disturbed" may be completed and submitted.

9. A written report detailing the undertaken Authorised Activities, outcome, unintended incidents, injuries and mortalities of threatened fauna, implemented monitoring, mitigation and management, and explaining the records and information as required in a DBCA approved "Return of Fauna Taken/Disturbed" must be submitted, in addition to a "Return of Fauna Taken/Disturbed" to DBCA Wildlife Licensing Section (wildlifelicencing@dbca.wa.gov.au).

ADDITIONAL INFORMATION

1. Before undertaking the Authorised Activity, permission must be obtained from: (a) the owner or occupier of private land; or (b) the department or authority controlling Crown land, on which the threatened fauna occurs. This includes obtaining the written endorsement from Department of Biodiversity, Conservation and Attractions (DBCA) if the Authorised Activity is proposed for land managed by DBCA.
2. This Authorisation to take or disturb threatened species does not constitute lawful authority issued under regulations 4 and 8 of the *Conservation and Land Management Regulations 2002*. Contact the applicable Department District Officer for further information.
3. The approved DBCA "Return of Fauna Taken/Disturbed" template can be obtained from DBCA Wildlife Licensing Section (wildlifelicencing@dbca.wa.gov.au).
4. Any interaction involving nationally listed threatened fauna that may be harmful to the fauna and/or invasive may require approval from the Commonwealth Department of the Environment and Energy (<http://www.environment.gov.au/biodiversity/threatened/permits>). Interaction with such species is controlled by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and *Environment Protection and Biodiversity Conservation Regulations 2000*.
5. It is the responsibility of the Authorisation Holder to ensure that they comply with the requirements of all applicable legislation.
6. An Authorisation to take or disturb threatened species does not constitute an animal ethics approval or a licence to use animals for scientific purposes as required under the *Animal Welfare Act 2002* and *Animal Welfare (Scientific Purposes) Regulations 2003*. Enquiries relating to the Animal Welfare Act scientific purposes licence and animal ethics committee approvals are to be directed to the Western Australian Department of Primary Industries and Regional Development (<https://www.agric.wa.gov.au/animalwelfare>).



 Dr Margaret Byrne
 Executive Director of Biodiversity and
 Conservation Science
 AS DELEGATE OF THE MINISTER
 DATE: 28/7...../2022