

Memorandum

18th February 2025

To:

MARVELUS
BERRIES



Copy to: NA

From:

Associate Professor Stephen Beatty, Dr Mark Allen

Centre for Sustainable Aquatic Ecosystems

Harry Butler Institute

Murdoch University

90 South Street, Murdoch Perth WA 6150

Australia

Email: s.beatty@murdoch.edu.au

Subject: Aquatic faunal survey of Lot 9951 Boorara Brook and assessment of impact of potential dam construction.

1. Scope

Marvelus Berries is proposing to construct a dam on an easterly flowing tributary of the Gardner River for the purposes of irrigated agriculture on Lot 9951 Andrews Rd Boorara Brook. The field and desktop fauna survey report prepared by SW Environmental (2024) identified the potential for four species of threatened fishes to be within a 10 km buffer from the location of the proposed dam. These included *Galaxiella munda* (Vulnerable WA *Biodiversity Conservation Act 2016* (WABCA, 2016), *Galaxiella nigrostriata* (Endangered WABCA, 2016; Endangered Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC, 1999)), *Nannatherina balstoni* (Vulnerable WABCA, 2016; Vulnerable EPBC, 1999), and *Lepidogalaxias salamandroides* (Endangered WABCA, 2016). The likelihood of occurrence of these species within the survey area (i.e., the footprint of the proposed dam) was assessed as “*Unlikely but may occur offsite upstream and downstream, Possible in the remnant patch east of the powerline.*”

Department of Water and Environmental Regulation then advised in a letter dated 22 October 2024 to Marvelus Berried that further information be provided on these fishes. *Specifically, they provided the following requirements and rationale in relation to the requested information.*

Information requirements

“An aquatic fauna survey is required for the area proposed to be cleared. Please note that should threatened or priority fauna be identified, additional surveys of surrounding areas will also be required to determine the species’ local population size and distribution.”

2. Methods

The aquatic survey involved sampling five sites on lot 9951 (Figure 1). These sites were surveyed downstream (Figure 2), within and upstream of the existing dams on the perennial tributary (Figures 3, 4) and encompassed the proposed clearing footprint to directly address the DWER requirement in relation to the proposed clearing permit. Surveys occurred during baseflow in early February 2025.

A summary of the methods are as follows.

- Sampling for fish and crayfish involved the use of a combination of fyke-netting set overnight and back-pack electrofishing in wadable habitats. This regime was designed to detect all species of fish and crayfish with fyke netting being the key method used by DWER under its South West Indicator of River Condition (SWIRC) protocols.
- The presence/absence of Freshwater Mussel (*Westralunio inbisi*) was determined through hand searching bank habitats and visually searching for mussels on exposed banks.
- All fish and crayfish captured were identified, enumerated, and a sub-sample individually measured to provide a more fine-scale indication of population structure and viability.
- All native fish and crayfish were released unharmed at the site of capture and all introduced species were euthanised on site in accordance with Murdoch University Animal Ethics protocols (ID849).

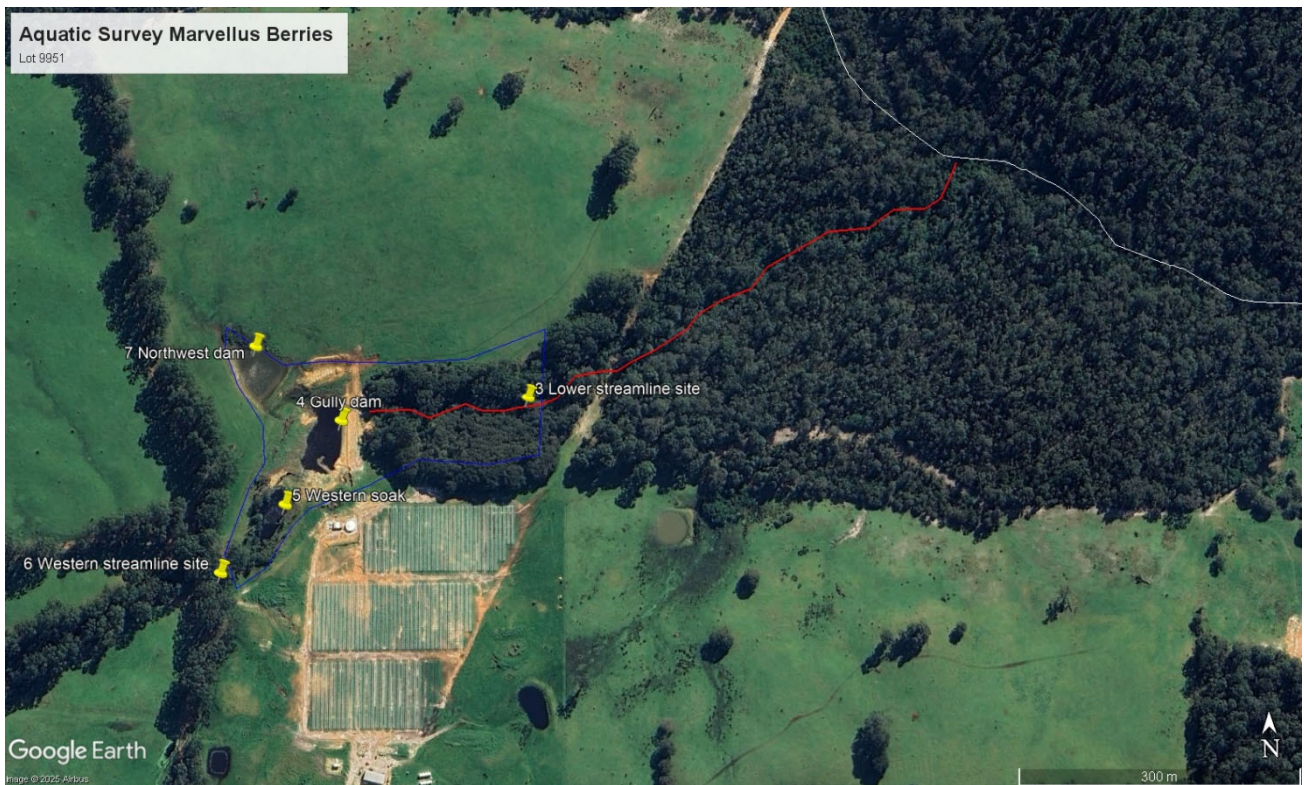


Figure 1: The sites surveyed in February 2025 at Lot 9951, Andrews Rd Boorara Brook. N.B. the blue outline on Lot 9951 is the approximate footprint of the proposed dam and the red line indicates the estimated streamline of the tributary including its confluence with the Gardner River which is indicated by the white line at the eastern margin of the map.



Figure 2: Sampling site 1, located downstream of the existing dams on Lot 9951.



Figure 3: Sampling site 2 located in the Gully Dam on Lot 9951 looking (top) downstream and (bottom) upstream. N.B. the compromised dam wall visible in both images.



Figure 4: Upstream sampling sites on Lot 9951 looking downstream from the Northwest Dam towards the Gully Dam. Also highlighted is the small soak dam (Site 3) and the upper streamline (Site 4).

2. Key findings

The February 2025 survey detected only one species of common freshwater fish (Western Minnow, *Galaxias occidentalis*) in the perennial tributary on Lot 9951 (Table 1). It also detected the native freshwater crayfish the Smooth Marron (*Cherax cainii*), Koonac (*Cherax preissii*) and the introduced Yabby (*Cherax destructor*). No listed threatened species were detected during the survey. The Western Minnow was recorded at the lower stream site (approximately located where the proposed dam wall would be constructed, Site 1), within the existing Gully Dam (Site 2), and upstream of the Western soak (i.e. at the Western streamline site, Site 4) (Table 1). While outside of the scope of the survey, it is likely that the species also occurs on the neighbouring property to the west of Lot 9951. The size distribution of the species (Figure 5) suggests that it is self-maintaining within the perennial tributary and using it as a dry season refuge. However, it was only found in relatively low abundances. It is highly likely that the tributary below the existing dams on Lot 9951 is also used as a spawning habitat by Western Minnow and potentially other common species during their winter-spring breeding periods. This could only be confirmed by sampling during the high-flow period. However, the presence of the existing Gully Dam may have limited the spawning distribution of native fishes to the ~800 m of streamline downstream of the dam prior to the major breach of the dam wall that occurred in winter 2024 that may have facilitated upstream passage of the Western Minnow past that point. Noting that the Western Minnow has the strongest known swimming ability of native fishes in south-western Australia.

Morgan *et al.* (1998) recorded the Balston's Pygmy Perch, Black-stripe Minnow, Mud Minnow and Salamanderfish within the Gardner River watershed. A review of the DWER Healthy Rivers assessments using SWIRC was also conducted in the Gardner River by the author of this Memorandum. This revealed three DWER survey sites in the Gardner River: a site in the main channel ~4 km downstream of the Marvellus Berry properties on Gardner River Road (AWRC Reference 6061067), one ~8 km downstream of the properties on Chesapeake Rd (AWRC Reference 6061070) and a site ~5 km upstream of the properties on Boorara Rd (AWRC Reference 6061108). Fish detected at all those sites by DWER included the common Nightfish (*Bostockia porosa*), Western Pygmy Perch (*Nannoperca vittata*), and Western Minnow (*Galaxias occidentalis*). No listed threatened species were detected.

Concerningly, the current survey discovered populations of the Yabby (*Cherax destructor*) in the Gully Dam (Site 2) and Northwest Dam (Site 5). This freshwater crayfish is native to eastern Australia but has been introduced in south-western Australia in farm dams, particularly in the wheatbelt, and has spread to some natural drainages. Its presence at Lot 9951 is a concern given the potential deleterious impacts this species is known to have on native freshwater crayfish and other native aquatic fauna. It is also reputed to weaken the integrity of earthen dams through its burrowing tendencies. The stocking of this species in dams west of the 'yabby line' (a line that roughly traces the path of the Albany Highway) is strictly prohibited due to its negative ecological impacts and the difficulty of eradicating established populations. The breached wall of the Gully Dam may allow the species to spread downstream, however none was detected in this stretch of creek (Site 1) during our survey.

Table 1. Presence of fish and crayfish at the sites surveyed on Lot 9951 in February 2025.

Species	Site 1	Site 2	Site 3	Site 4	Site 5
Native Freshwater Fish					
Western Minnow <i>Galaxias occidentalis</i>	✓	✓		✓	
Native Freshwater Crayfish					
Smooth Marron <i>Cherax cainii</i>	✓	✓			
Koonac <i>Cherax preissii</i>				✓	✓
Introduced Freshwater Crayfish					
Yabby <i>Cherax destructor</i>		✓			✓

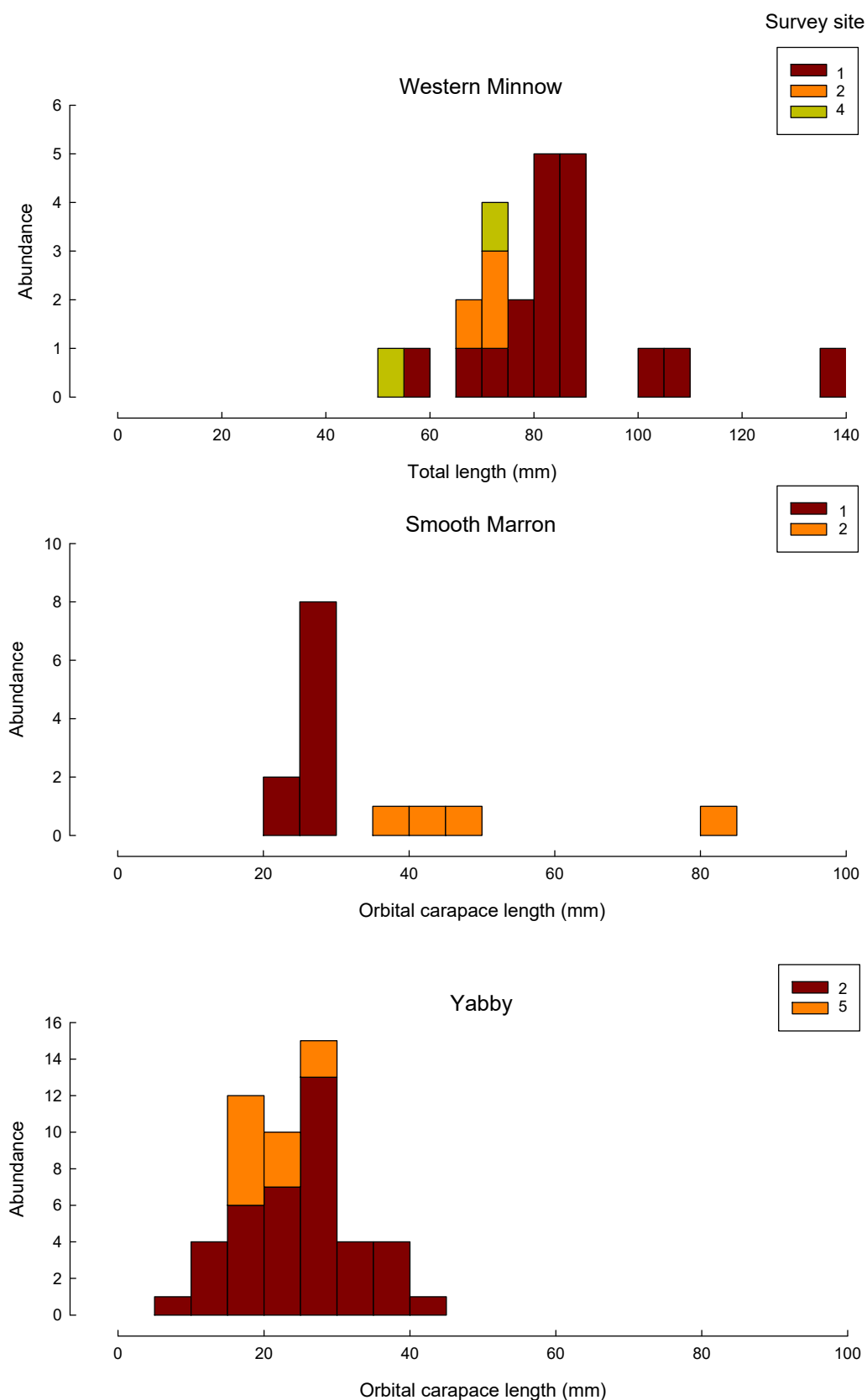


Figure 5: Length-frequency distribution of the native Western Minnow and Smooth Marron and the introduced Yabby at sites on Lot 9951. Note the multiple size cohorts of all species.

3. Implications of dam construction

The results of the February 2025 survey enable a broad assessment of the potential impacts of the proposed dam construction on native fishes. However, its impact would be dependent on several assumptions, including the previous distribution of native species relative to existing dams. The following impacts assume the proposed dam is constructed without incorporating a fish ladder. These are summarised as follows:

- There is no evidence that the construction of the dam would impact listed threatened fish species aside from the annual attenuation of its water volume (having a capacity of 300ML). Noting the mean discharge in the Gardner River (2015-2024) was ~82000 ML (DWER Site 606218 Gardner River - Baldania Ck confluence).
- However, additional surveys in higher flow periods would be needed to confirm whether threatened fishes use the lower reaches of the stream on Lot 9951 in higher flow periods. It is very unlikely that Black-stripe Minnow or Salamanderfish use the stream given their habitat preferences (i.e. wetlands/peat swamps). It is possible that Balston's Pygmy Perch and/or Mud Minnow use the lower reaches of the stream.
- The construction of the dam would likely reduce the extent of dry season refuge for the common Western Minnow by ~250 river metres (i.e. the distance between the existing Gully Dam wall to the proposed new dam wall). This is assuming the distribution of the Western Minnow was previously limited to being downstream of the existing Gully Dam (Site 6) prior to the wall being breached in winter 2024. This is also assuming that the construction phase of the dam causes the loss of the population upstream of the proposed dam wall.
- It is possible that the species now exists farther upstream from the sites surveyed in the current study (i.e., upstream of Site 6 and upstream of the construction footprint of the dam). If this is the case, then it is possible that the population would use the new dam as a refuge and continue to be self-maintaining in the upper section of the catchment. However, if no upstream movement of fish occurs over the new dam wall, then that population would be genetically isolated from the rest of the Gardner River population.
- The construction of a bypass is recommended to ensure continuation of perennial flows to the streamline downstream of the dam to enable it to be used as a dry season refuge by the Western Minnow.
- The construction of a fish ladder would facilitate the upstream passage of Western Minnow past the proposed dam (and possibly other native fishes depending on their colonisation during higher flows), however, this would only have a marginal benefit to the Gardner River population given that the aquatic habitat upstream of the dams on Lot 9951 has been heavily degraded by land clearing for agriculture.
- We recommend that Yabby eradication strategies be investigated that could coincide with construction of the proposed larger dam to reduce the likelihood of this invasive species spreading into habitats downstream of the property, including the Gardner River main channel.

Further Reading

Beatty, S.J., Morgan, D.L. & Lymbery, A.J. (2014). Implications of climate change for potamodromous fishes. *Global Change Biology* 20: 1794-1807.

Beatty, S.J., Seewraj, K, Allen, M.G., Keleher, J. (2014). Enhancing fish passage over on-stream farm dams in south-western Australia: a case study. Special Issue on Western Australian Freshwater Fishes. *Journal of the Royal Society of Western Australia* 97(2):313-330.

Morgan, D.L., Gill, H.S. & Potter, I.C. (1998). Distribution, identification and biology of freshwater fishes in south-western Australia. *Records of the Western Australian Museum Supplement* 56: 1-97.

Morgan, D.L., Unmack, P.J, Beatty, S.J., Ebner, B.C., Allen, M.G., Keleher, J.J., Donaldson, J.A. & Murphy, J. (2014). An overview of the 'freshwater fishes' of Western Australia. *Journal of the Royal Society of Western Australia* 97: 263-278.