



Fauna Technical Note No. 16:

Assessing juvenile giant freshwater crayfish habitat in Class 4 streams



The Fauna Technical Note Series provides information for Forest Practices Officers on fauna management in production forests. These technical notes are advisory guidelines and should be read in conjunction with the requirements of the Forest Practices Code.

The Technical Notes can be accessed on the Forest Practices Authority's website: www.fpa.tas.gov.au

1. Introduction

The aim of this technical note is to provide guidance on the identification of habitat quality for juvenile giant freshwater crayfish (*Astacopsis gouldi*) in areas proposed for forestry operations. The giant freshwater crayfish (GFC) is listed as Vulnerable under the Tasmanian *Threatened Species Protection Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The range of the GFC extends from the Arthur River, in the north-west, across the north of the state to the Ringarooma River. It comprises all river catchments flowing into Bass Strait with the exception of the Tamar catchment. The species has also been introduced to two catchments: the North Esk catchment (St Patricks River) and the Derwent catchment (Clyde River).

Potential habitat for the GFC is found in streams of all sizes. Characteristics of potential GFC habitat include a combination of well-shaded flowing and still waters, deep pools, decaying logs and undercut banks. Native riparian vegetation needs to be predominantly intact to provide shade, nutrient, energy and structural inputs into streams. Research has found that smaller juveniles inhabit shallow fast-flowing streams favouring habitats with rocks or logs that are large enough to be stable but not embedded in finer substrates, which overlie coarser substrates and/or have a distinct cavity underneath. Perennial headwater streams have substantially higher juvenile GFC densities than non-perennial headwater streams.

The references section of this technical note provides more information on GFC habitat and ecology.

2. Determining Management Actions for Class 4 streams

There are four steps to determine management actions for potential GFC habitat in Class 4 streams:

1 Use the GFC Habitat Suitability Map to check if suitable habitat may occur in FPP area (Section 3)



2 Conduct field survey if required (Section 4 and Appendix 1)



3 Assess results of field survey (Section 5)

Assessment must be undertaken by FPOs, planners or consultants who have attended a GFC training course or are otherwise accredited by FPA. Assessment by FPA staff or consultants may be needed in some situations.



4 Consult the Threatened Fauna Adviser 2014 for recommended actions and then **develop management actions to incorporate into FPP** (Section 6)

Liaison with FPA Biodiversity Program may be needed.

3. The GFC Habitat Suitability Map

A map showing the distribution of potentially suitable habitat for GFC was produced in 2007 (Davies *et al.* 2007) by the FPA and has been endorsed by DPIPW for use in planning. The background information (Davies *et al.* 2007) for this map is available via the FPA website (www.fpa.tas.gov.au). The map uses stream and landscape variables to identify potential GFC habitat. Information on habitat quality can be used to develop management actions, including protection and restoration of high quality habitat.

The map is available as a shape file for anyone planning operations within the range of the GFC. The map is available via the Webmap page on the Biodiversity Values Database on the FPA website. Contact the FPA if you have problems accessing it.

The map shows three categories of potential habitat quality – high suitability habitat, moderate suitability habitat and low suitability habitat. Field assessments can be used to validate the map.

4. Field survey method

FPOs, forest planners or consultants can conduct field surveys. It is desirable that surveys are done by people who have attended a GFC field training course or are otherwise accredited by FPA.

The following methods can be used to sample each class 4 stream within an area requiring a survey. Habitat suitability can change over short distances. Each stream should be examined in manageable sections (e.g. 50m section, or where the habitat quality noticeably changes). The assessment should consider the entire section of stream allocated to that survey. The surveyor should record information on the habitat characteristics detailed in Table 1, which can be done using the **Stream Survey Sheet** (Appendix 1). Experienced surveyors need only record the results for the overall highest quality habitat found along a stream. The stream survey sheet has a completed example for one stream section. Photos in Appendix 2 show examples of High, Moderate and Low Suitability GFC stream habitat.

Surveyors may find it useful to take photos of the stream for their records or to send to FPA Biodiversity Program staff if you need help in classifying habitat.

The information collected from each stream survey allows the overall suitability of GFC habitat to be assessed for each Class 4 stream (see Section 5).

5. GFC habitat assessment

Results of field surveys **must** be assessed by FPOs, planners or consultants who have attended a GFC training course or have habitat assessment skills recognised by FPA. In many cases, this will be the person undertaking the field survey. Use of peer review is encouraged.

The **overall GFC habitat suitability class** for each Class 4 stream in the coupe should be determined by following these two steps:

1. Decide on the habitat suitability for each section of stream surveyed. This can be determined by 'averaging out' the Low, Moderate and High results for each habitat factor (see example on survey sheet).
2. Then determine the overall GFC habitat suitability of the Class 4 stream. If stream survey sections are rated differently (e.g. Low, Moderate, Low) the highest suitability rating should be taken. For example, in a stream with Low, Moderate, Low suitability stream survey sections, the overall GFC habitat suitability for this Class 4 stream would be Moderate.

Specialist assessments by FPA Biodiversity Program staff or suitably qualified consultants may be needed in some situations – this will depend on the results of the field survey or subsequent assessment.

6. Recommended management actions

Once you have determined the habitat quality for a particular class 4 stream then the recommended management actions can be obtained by running the Threatened Fauna Adviser. This decision support program is available via the FPA web-site.

Table 1. Characteristics of streams and how they relate to habitat suitability for juvenile GFC.

Stream characteristic	Habitat quality
Stream flow and permanence	Streams with more permanent water features (e.g. pools, continuously flowing) provide better habitat than ephemeral streams.
Substrate type	Very fine substrates like silts and clays can accumulate in cavities that would otherwise provide suitable shelter sites for GFC and fine sediments can suffocate juveniles Therefore streams with high levels of fine sediments are less likely to be used by GFC than streams with coarse substrates like gravels and boulders.
Condition and cover of native riparian vegetation	Riparian vegetation regulates the stream environment (temperature, humidity, light) and is a source of food for GFC. Streams with a greater cover of riparian vegetation in good condition provide better habitat for GFC than streams with low cover or poor quality riparian vegetation.
Slope of stream	Streams on steep slopes tend to flow faster than streams on gentle slopes. Fast flowing water can move in-stream features like boulders and logs, and dislodge juvenile crayfish from their shelters. Therefore permanent streams on gentle slopes often provide better habitat for GFC than streams on steep slopes.
Volume of logs lodged in stream bed	Juvenile crayfish need to shelter from potential predators like platypus and adult GFC. They do this by burrowing under stable features in the streams, such as logs and boulders. Streams that have more logs are likely to provide more suitable shelter sites for juvenile GFC.
Presence of boulders in stream	Boulders in the stream are one of the most important shelter sites for juvenile GFC, so streams with more boulders are more likely to be used by juvenile GFC.
Characteristics of boulders in stream (width > 40cm; cavity underneath)	Juvenile GFC create and use cavities under suitable shelter sites such as boulders, but not all boulders are likely to provide suitable shelter. Larger boulders are less easily moved by water and potential predators. Boulders that are embedded in fine substrate will not provide suitable conditions for crayfish.
Cover of moss on boulders	Moss on boulders has been associated with the presence of juvenile GFC. The reason for this is probably because moss indicates a suitable microclimate for the species, and moss on boulders in particular indicates that the flow regime of the stream is likely to be gentle enough to accommodate the species.

7. When to seek advice from FPA

Advice should be sought from FPA when:

- the FPO, planner or other assessor is unsure of the habitat quality of a class 4 stream; **OR**
- when the appropriate recommendation from the Threatened Fauna Adviser 2014 cannot be implemented.

When seeking advice from FPA the following information should be submitted:

- completed stream survey sheets
- photos of the stream (photo points to be marked on a map).

FPA recommends that stream survey sheets are kept with your coupe file and copies forwarded with your notification. FPA Biodiversity Program staff will monitor implementation of this planning process and planning map. Such monitoring is required by the Giant Freshwater Crayfish Recovery Plan and the procedures we have agreed with DPIWE for the management of threatened species in areas covered by the Tasmanian forest practices system.

References

- Davies, PE and Cook, LSJ 2004, *Juvenile Astacopsis gouldi in headwater streams – relative abundance and habitat*, report to the Forest Practices Board, April 2004, 42 pp.
- Davies, PE, Munks, SA, Cook, LSJ, Von Minden, P and Wilson, D 2007, *Mapping suitability of habitat for the giant freshwater crayfish, Astacopsis gouldi*, FPA Scientific Report No. 4.
- Davies, PE, Cook, LSJ, Munks, SA and Meggs, J 2005, 'Astacopsis gouldi Clark: habitat characteristics and relative abundance of juveniles', *Tasforests* 16: 1–18.
- Threatened Species Section 2006, *Giant Freshwater Lobster Astacopsis gouldi Recovery Plan 2006–2010*, Department of Primary Industries and Water, Hobart.

Publication details

This Technical Note has been prepared by FPA's Biodiversity Program staff. It should be cited as:
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Fauna Technical Note No. 3, Forest Practices Authority, Hobart.

Contact details

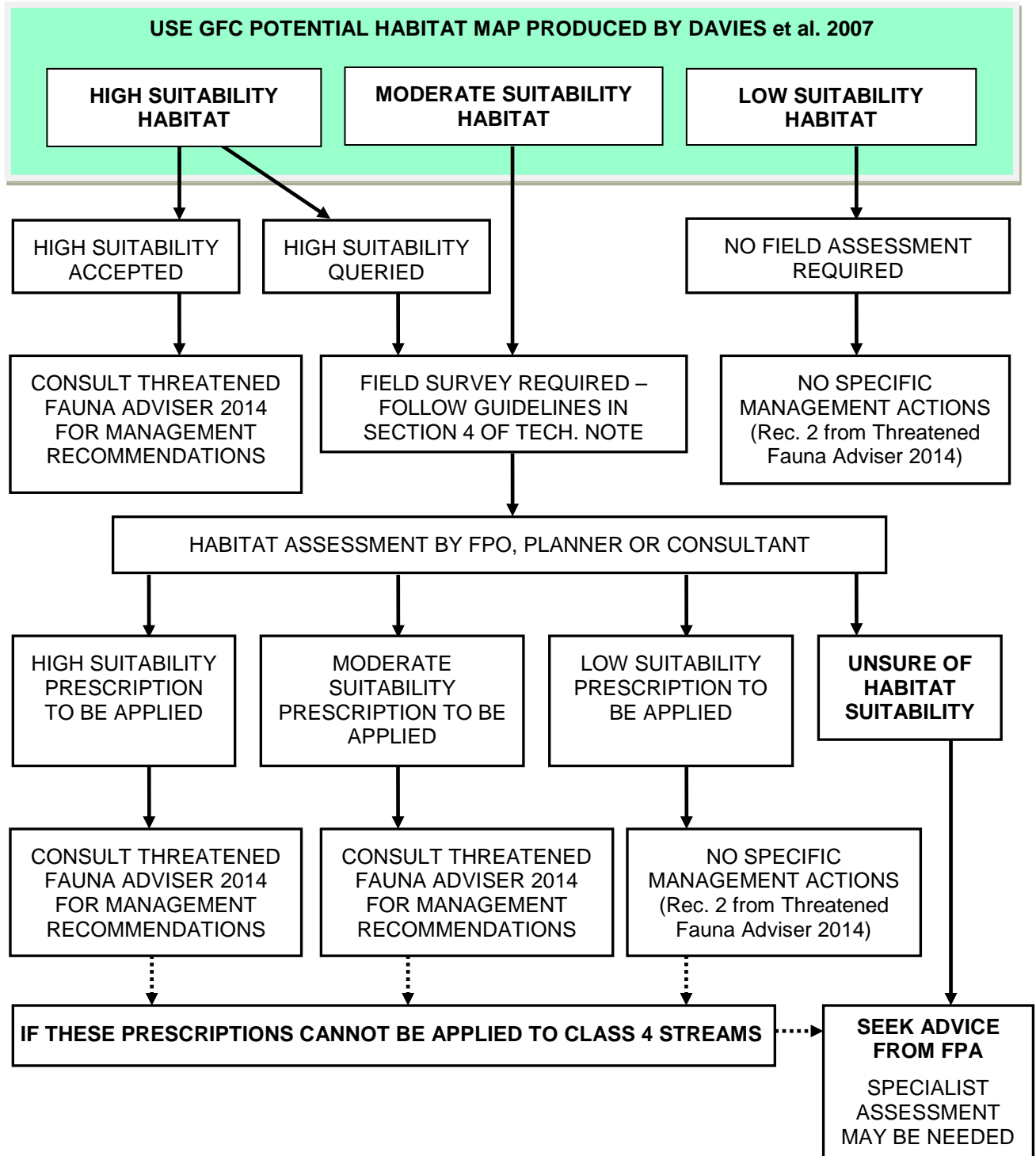
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Figure 1. Habitat assessment pathway for GFC habitat in Class 4 streams

This flow chart delivers provides advice on how to apply the GFC potential habitat map 2007 and when a survey and/or advice from FPA biodiversity program may be required.



Appendix 1: GFC HABITAT SUITABILITY SURVEY SHEET FOR CLASS 4 STREAMS

This sheet should be completed for each Class 4 stream within the FPP area which requires a survey. The complete length of the stream within the coupe should be surveyed if possible. The factors below should be considered over each of the different sections of the stream, although experienced surveyors need only fill out the form for the section of the stream found to have the highest habitat suitability.

Coupe or location	Stream name/identifier (mark on map)			Surveyor				Date surveyed	
FACTOR	HABITAT SUITABILITY			STREAM SURVEY				ASSESSOR COMMENTS (include info on photos taken)	
	LOW	MODERATE	HIGH	Example	1	2	3		
Stream flow and permanence	Ephemeral ^a : dries up seasonally	Occasional: some permanent pools but stream not always flowing	Permanent: pools and flowing water	L					
Substrate type	Fine sediments: > 50% silt or clay	Roughly equal amounts of fine and coarse substrates	Coarse substrates: >50% boulders, cobbles or pebbles	M					
Condition and cover of native riparian vegetation	Poor: < 30% native veg cover	Moderate: 30-60% native veg cover	Excellent: >60% native veg cover	L					
Slope of stream	Greater than 20%	10–20%	Less than 10%	M					
Volume of logs ^b lodged in streambed	Few: Stream channel has few logs contacting streambed	Stream channel has about 1–2 logs contacting streambed every 5m	Many: Stream channel has >2 logs contacting streambed every 5m	M					
Presence of boulders (>40 cm) in stream	None or very scattered	Occasional	Many	H					
Characteristics of boulders in stream: width >40cm; cavity underneath	None or very few with optimum characteristics	Occasional with optimum characteristics	Many with optimum characteristics	L					
Cover of moss on boulders in stream	Average of < 10% across all boulders	Average of 10–50% across all boulders	Average of > 50% across all boulders	M					
GFC habitat suitability of each stream survey This should be the 'averaged' ratings for above factors*, unless the section of stream surveyed has one of the habitat features shaded in grey in which case the rating for that particular habitat factor should be the overall rating for that stream survey section.				M					

^a Only classify as ephemeral if totally confident stream dries up seasonally. If any uncertainty, classify as occasional or permanent.

^b Logs to be considered are over 10 cm diameter.

OVERALL GFC HABITAT SUITABILITY OF CLASS 4 STREAM IN FPP AREA	HIGH	<input type="checkbox"/>	MODERATE	<input type="checkbox"/>	LOW	<input type="checkbox"/>
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*See Section 5 for explanation.

Appendix 2: Examples of habitat suitability categories

High quality habitat



Stream 1 with permanent flow, high percentage of large mossy boulders, cavities beneath some boulders and banks undercut. Good native riparian cover.



Stream 2 containing pools, large in-stream logs, some undercut banks, riffle areas and mossy boulders.

Moderate quality habitat



Stream 1 has permanent flow and shows evidence of some pooling, good native riparian cover.

Stream substrate has some fine sediment cover, but there are some in-stream logs and rocks.



Streams 2 and 3 have permanent flow, good native riparian vegetation and some coarse sediment, but have no pools and lack boulders and in-stream logs.



Low quality habitat



Stream 1 shows (probable) permanency but substrate consists of fine sediments and lacks boulders and in-stream logs. Native riparian cover moderate.



Stream 2 shows poor water quality with substrate covered by fine depositional silt. Occasional riffles and in-stream wood, but no boulders or large logs.



Stream 3 is ephemeral, showing some erosion features.

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Version Control

Version	Date	Author(s)	Summary of changes
0.1	Aug 2009	Biodiversity Section Staff	Document creation
0.2	Feb 2011	Nina Roberts	Addition of document control information. Date in footer left unchanged because not other changes to wording in document.
0.3	June 2013	Amy Koch	Minor formatting changes
0.4	April 2014	Anne Chuter	Changes to make the technical note consistent with the Threatened Fauna Adviser 2014. Circulated to FPOs Trim ref 2009/87021
0.5	Sept 2014	Chris Grove and Sarah Munks	Minor edits and Trim ref change to 2014/192034.
0.6	Oct 2014	Amy Koch	Minor edits made to formatting in response to FPAC
1.0	Nov 2014	Amy Koch	Remove DRAFT watermark and indicate endorsement by Board
1.1	March 2015	Amy Koch	Edits to survey sheet to more accurately capture suitable streams. Some changes to text in the document to clarify intent.
1.2	April 2016	Amy Koch	Edit to remove necessity of taking photographs and filling form in for every 50m of stream following feedback from planners.

Stages required for release outside FPA

Category of advice (A1, A2, B1, B2, B3 or C):		A2
Stages	Required/not required	Completed (date)
Specialist	Required	27/3/15
Line Manager	Required	8/2014
Peer/FPO/stakeholder review	Required	8/2014
CFPO	Required	8/2014
FPAC	As required by the Board	31/10/14
Board	Required	11/2014

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