Nathan Dam Project

SURVEY FOR THE BOGGOMOSS SNAIL

- Final
- 11 September 2009

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Contents

List of Figures

List of Tables

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1. Introduction

Sinclair Knight Merz (SKM) was engaged by SunWater to complete targeted surveys for the nationally threatened Boggomoss Snail (*Adclarkia dawsonensis*) within the Taroom region in central Queensland. Further information on the snail's distribution, population estimates and potential translocation sites are required to enable SunWater to develop management strategies for the Boggomoss Snail as part of the Nathan Dam and pipeline project on the Dawson River.

This report provides the results of targeted field surveys completed between the 19th and 25th of July, and 17-21st August 2009, an assessment of habitat areas in which the snail was found and a revised population estimate for the species, based on the results of density estimates obtained during the field survey.

1.1. Project Background

The Boggomoss Snail is listed as critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Prior to the completion of additional studies on the snail as part of the Nathan Dam project, the snail was known only from two locations in the vicinity of the Dawson River. A population is known from a boggomoss (mound spring) adjacent to the Dawson River on Mt. Rose Station approximately 32 kilometres north-east of Taroom and another population is known from the downstream Camping and Stock Reserve at the Isla-Delusion Road crossing of the Dawson River ('Isla-Delusion Camping Reserve'), approximately 29 km south of Theodore. The Isla-Delusion Camping Reserve site covers an area of approximately 44.5 hectares and the boggomoss at Mt. Rose Station cover an area of 0.75 ha. The known populations are separated by approximately 60 km straight line distance.

The Nathan Dam will inundate the boggomoss on Mt. Rose Station and will significantly impact on a population of Boggomoss Snails. The approved National Recovery Plan for the Boggomoss Snail, *Adclarkia dawsonensis* (Stanisic 2008) notes that it should be possible to relocate snails from the boggomoss site should the dam be approved; however it does not list this as a recommendation. SunWater has engaged Dr John Stanisic of Biodiversity Assessment and Management (BAAM) to prepare a Translocation Plan for the Boggomoss Snail in line with the Recovery Plan, which will aim to translocate a number of snails to alternative habitat (site(s) to be determined) outside of the project footprint.

The project was declared a controlled action by the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) on the 30th July, 2008 due to potential impacts on the snail as well as other Matters of National Environmental Significance. DEWHA has advised that the proposed translocation may not proceed until suitable translocation areas are identified. They have

also expressed concern that the total population of the snail is unknown and the site to be inundated at Mt Rose appears to be the most robust population. The surveys reported here aimed to provide further information on these issues.

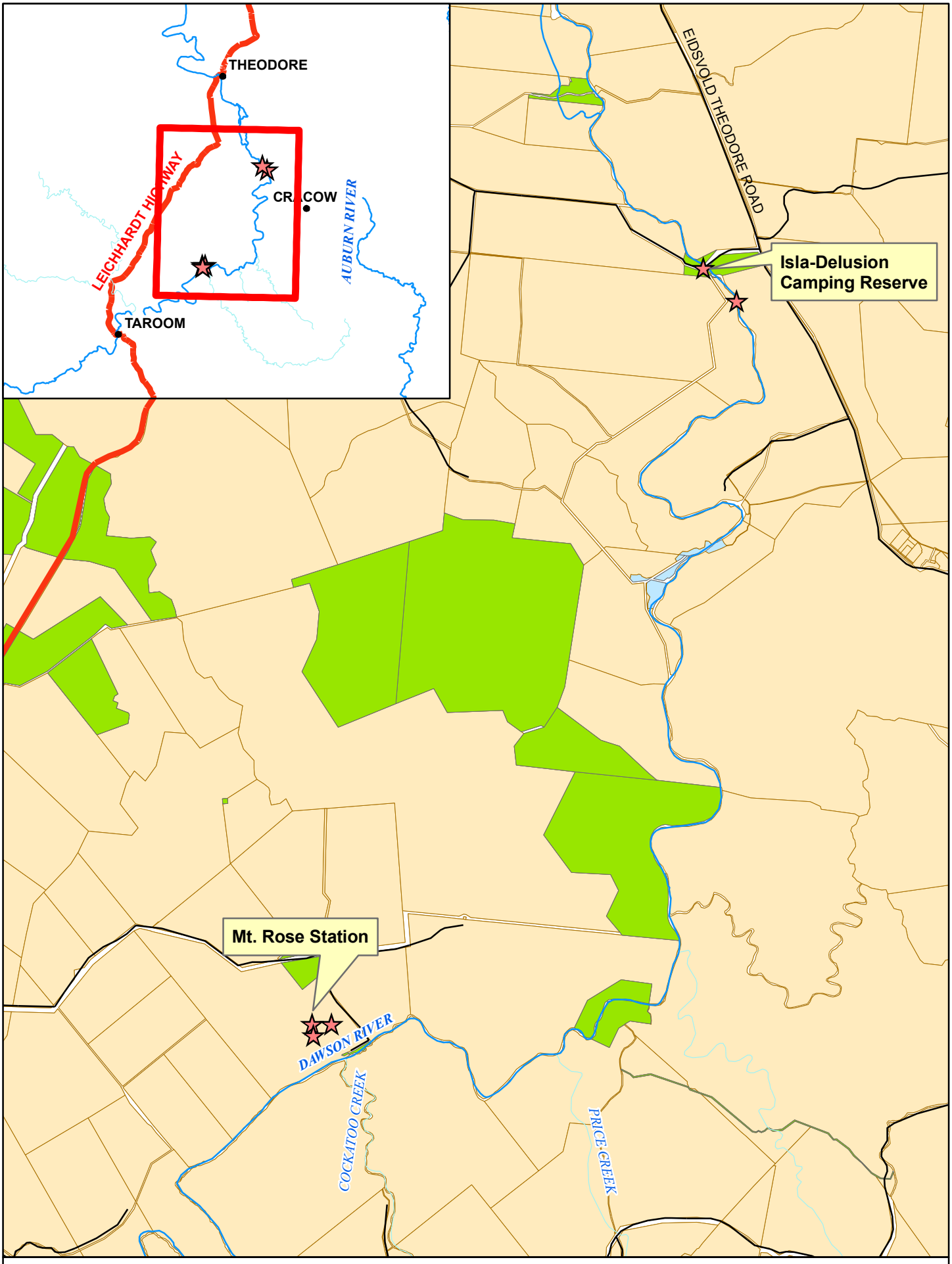
1.2. Previous Snail Surveys

Besides surveys by Dr. Stanisic in the late 1990's, a survey for the Boggomoss Snail was completed by BAAM, with field assistance by SKM, in late 2008 within the known sites and within similar habitat areas along the Dawson River from Taroom to Theodore. The objectives of the study were to:

- to determine if the Boggomoss Snail exists at other locations within the Dawson River Valley;
- to assess the condition of the existing Boggomoss Snail populations in an effort to more accurately estimate population sizes;
- to obtain additional information about the habitat and microhabitat requirements of the Boggomoss Snail that would assist in the conduct of translocation trials and the recovery of the species; and
- to select locations based on the above for the conduct of translocation trials that may also act as sites for potential translocation.

A total of 53 sites were searched within the Dawson River and selected major tributaries, including Cockatoo Creek, Palm Tree Creek and Spring Creek. A new location for the snail was found approximately 28 km upstream of the Isla-Delusion Camping Reserve on the Dawson River and two new populations were found on boggomosses on Mt. Rose Station (**Figure 1**). The population estimate at the existing boggomoss site was also revised to greater than 350 animals, up from an estimated less than 100 animals (Stanisic 2008).

Too few snails were collected during these surveys to estimate the population size at other than the original Mt Rose site.



LEGEND

- Known Sites
- Localities
- Major Roads
- Minor Roads
- Rivers
- Creeks

Land Use

- Reserves
- Water Reserves
- Other Tenures

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Kilometres

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NATHAN DAM - BOGGOMOSS SNAIL SURVEY

Figure 1 - Location of Previously Known Sites

Project Number: QE09463

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1.3. Habitat and Microhabitat Requirements

The Recovery Plan for the species and the BAAM (2009) report describe the habitat at each of the sites containing Boggomoss Snails. A summary of the habitat at each site is provided as follows:

- boggomosses on Mt. Rose Station – open forest of *Eucalyptus tereticornis* and *E. camaldulensis* with a mid-storey of *Ficus coronata/opposita* and generally grassy / litter ground cover. The constant upwelling of artesian spring water ensures the boggomoss retains a high level of moisture with deep peaty soil layer; and
- Isla-Delusion Camping Reserve and upstream site – riparian open forest of *E. tereticornis* and *E. camaldulensis*, often with a sub-canopy of *Livistona nitida*, a mid-storey of *F. coronata/opposita* and generally grassy / palm frond ground cover. The riparian areas of the upstream site are characterised by alluvial terraces and deep clayey loam soils.

1.4. Aim and Objectives

The aim of this survey was to gather further information on the spatial distribution and population size of the Boggomoss Snail within the Dawson River catchment. The objectives of this survey were:

- to locate any additional populations of the Boggomoss Snail throughout the Dawson River catchment, including outside the range of historic search effort and within marginal habitat areas;
- to provide an estimate of the size of the population within its distribution; and
- to provide a preliminary assessment of newly identified habitat areas for translocation purposes.

2. Methodology

2.1. Introduction

This section provides the details of the methods used to identify potential habitat areas, to search for the Boggomoss Snail and to estimate population sizes. These methodologies were modified from those detailed in the BAAM (2009) report.

2.2. Site Selection

The Boggomoss Snail is thought to be historically associated with the alluvial systems of the Dawson River catchment. To provide a 'first cut' of potential search areas the regional ecosystem data for the Taroom and Banana Shire local government areas were reviewed. A map was produced showing all remnant vegetation patches occurring on land zone 3 within an 80 km radius of Taroom township. Land zone 3 is described as "Quaternary alluvial systems, including floodplains, alluvial plains, alluvial fans, terraces, levees, swamps, channels, closed depressions and fine textured palaeo-estuarine deposits" (Sattler & Williams, 1999). These areas were preferentially targeted during the field survey.

Potential habitat within tenures such as National Parks, State Forests, Forest Reserves, local Council reserves and camping and stock route reserves was surveyed wherever possible, as these areas generally contain good quality remnant vegetation. Private tenures were not excluded from the searches although access was unable to be gained for a number of properties. Importantly, several of these properties contain habitat which is regarded as highly likely to support the Boggomoss Snail.

2.3. Species Identification

All dead snail shells found during the searches were collected and retained for identification purposes. It is very difficult to conclusively separate the target species from related species based on dead shells. Live snails were generally not collected unless the species was unable to be identified or if the species was suspected (but not known with certainty) to be the target species. Once identified and photographs taken, most live snails were returned to their individual habitats; however, some snails were vouchered for inclusion in the Queensland Museum's snail collection. All collections were made under SKM's scientific purposes permit (ref. no. WISP04231607).

2.4. Search Methodology

Three teams of two people each were involved in the first search effort (20th to 25th July, 2009) and one team of four people were involved in the second search (17th to 21st August, 2009). At each site, a pro forma was completed to gather basic floristic and microhabitat data associated with the existing vegetation (a sample pro forma is provided in **Appendix A**). A list of all snail species found (live and shells) were also recorded.

At each survey site, a 100 m linear transect was searched (as far as practicable) over a minimum of 1 person hour. Searching involved turning all ground debris including logs (underneath and within rotten portions), branches, litter piles, palm frond mats, rocks and bark at the base of trees. Ground debris was replaced to minimise damage to microhabitat, wherever possible. Where live Boggomoss Snails were identified, a transect was completed to enable an estimation of population size at the site. At some sites this was not possible due to the limited habitat available (i.e. less than 100 m of habitat) or the distribution of microhabitat was patchy.

2.4.1. Population Estimates

An estimate of population size was completed within discrete habitat patches where live specimens of the Boggomoss Snail were positively identified. This involved the erection of a 100 m transect (placed along the contour gradient, where possible) through similar habitat commencing at the location of the positively identified snail so as to include the presence within the overall transect result.

At every 10 m along the 100 m transect a 1 m by 1 m plot (giving a total search area of 10 m^2 per transect) was thoroughly searched by the methods described previously, whether that plot contained suitable habitat for the snail or not. Where possible, parallel transects were erected at varying distances from the river edge depending upon local topography and the total area of available habitat.

All habitat patches found to contain live snails were digitised in ArcMap from satellite imagery with a resolution of 2.5 metre pixels. The area of each habitat patch was then calculated in ArcMap. Patches tend to be discrete and clearly demarcated as a result of historic land clearing. The average density of live snails within habitat searched was calculated by dividing the number of live snails found by the total area searched within each transect.

A population estimate for each habitat patch could then be calculated by multiplying the average density of snails by the total area of the habitat patch.

The standard error (SE) for the dataset was calculated in Microsoft Excel and applied to the population estimate to give a population range.

The estimate of the total population of the species was the sum of the estimates from the identified suitable habitat patches where live snails were found. Sites where only shells were found were not included in the estimate nor were habitat patches that have not yet been searched or patches in which formal transects were not undertaken.

3. Results

3.1. Introduction

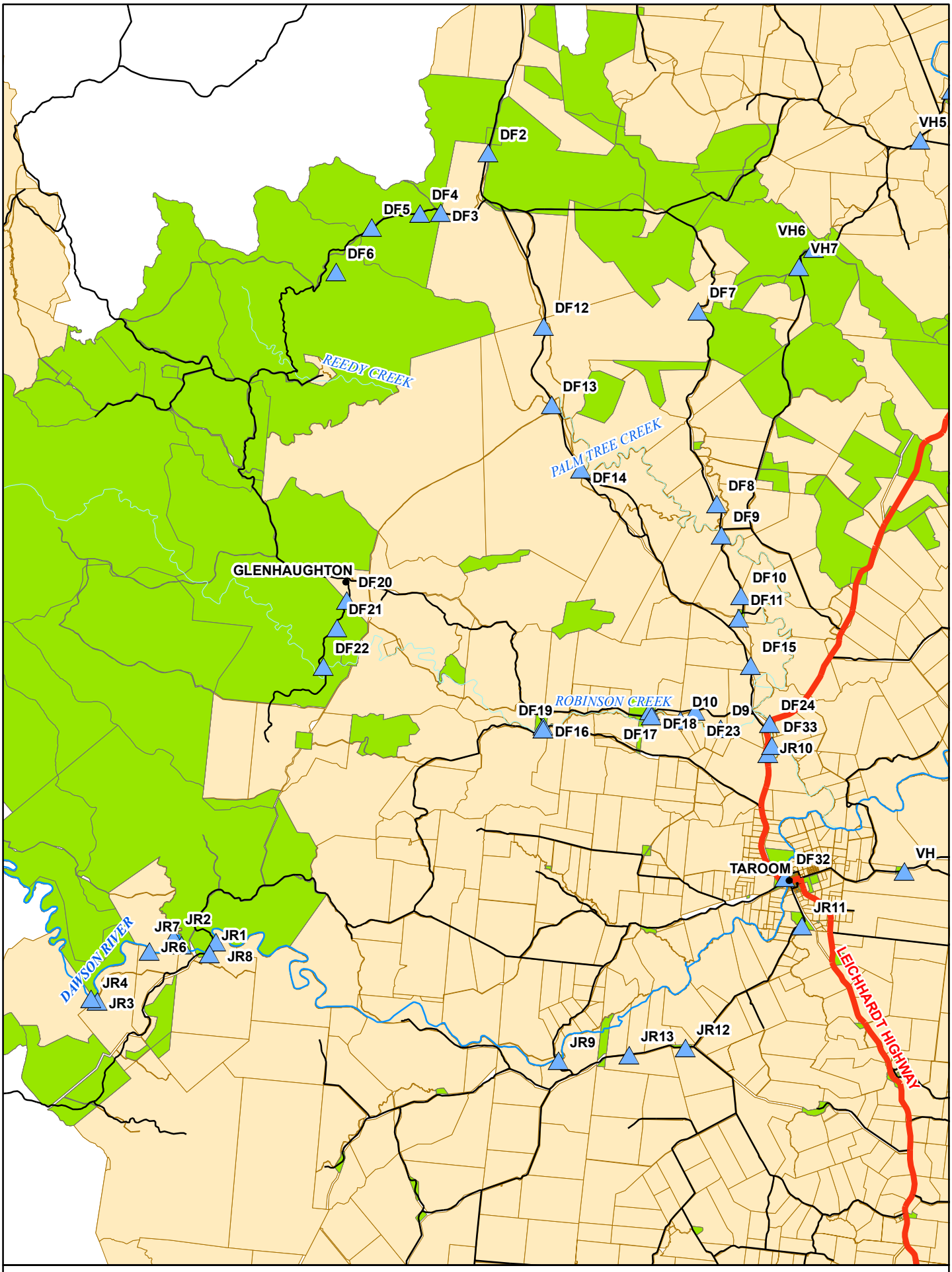
This section provides the results of the targeted field survey and presents an estimate of the total population size of the Boggomoss Snail within habitat patches searched. Previous population estimates from the Mt Rose site supplement the results of this survey to provide an overall population estimate.

3.2. Site Descriptions

A total of 106 sites were searched for the Boggomoss Snail within an overall project area of 14,400 km^2 (**Figure 2** and **3**). Searches were conducted within the upper Dawson River catchment including the Dawson River upstream of Taroom and downstream of Nathan Gorge and major tributaries including Cockatoo Creek, Robinson Creek, Palm Tree Creek, Price Creek and Cabbage Tree Creek. Habitats varied markedly depending upon location within the catchment. Upper catchment habitats were characterised by very dry sandy gullies containing such canopy species as Queensland blue gum (*Eucalyptus tereticornis*), Poplar box (*E. populnea*), Coolabah (*E. coolibah*) or Dawson gum (*E. cambageana*) over a midstorey of River oak (*Casuarina cunninghamiana*) or Bottlebrush (*Melaleuca viminalis*) fringing drainage lines. Brigalow (*Acacia harpophylla*) communities occurring on alluvium were also searched. Microhabitat structure was primarily provided by rotting timber and occasionally piles of woody debris that had accumulated from flood events although the substratum was predominantly dry.

Carnarvon Palm (*Livistona nitida*) tended to occur in the mid to lower catchment areas, although this species was sparse within most mid catchment sites searched. The lower reaches of Robinson Creek and Palm Tree Creek contained dense forests of *Livistona nitida* and this species is a regular component of riparian vegetation along the Dawson River from Glebe Weir to Theodore.

A brief description of each site is provided in **Appendix B**. A detailed description of sites in which live Boggomoss Snails were found is provided in **Appendix C.**


DF2
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DF6
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REEDY CREEK
DF13
PALM TREE CREEK
DF14
DF8
DF9
GLENHAUGHTON
DF20
DF10
DF21
DF11
DF22
DF15
ROBINSON CREEK
DF19
D10
D9
DF24
DF16
DF17
DF18
DF23
DF33
JR10
VH
DF32
TAROOM
JR11
JR2
JR7
JR1
JR6
JR8
DAWSON RIVER
JR4
JR3
JR9
JR13
JR12
LEICHHARDT HIGHWAY
LEGEND
Localities
Sites
Major Roads
Minor Roads
Rivers
Creeks
Cadastre
Reserves
Water Reserves
Other Tenures
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Kilometres
Scale - 1:500,000 at A4
Datum: GCS GDA94
NATHAN DAM - BOGGOMOSS SNAIL SURVEY
Figure 2 - Location of Western Survey Sites
Project Number: QE09463
SINCLAIR KNIGHT MERZ
SKM
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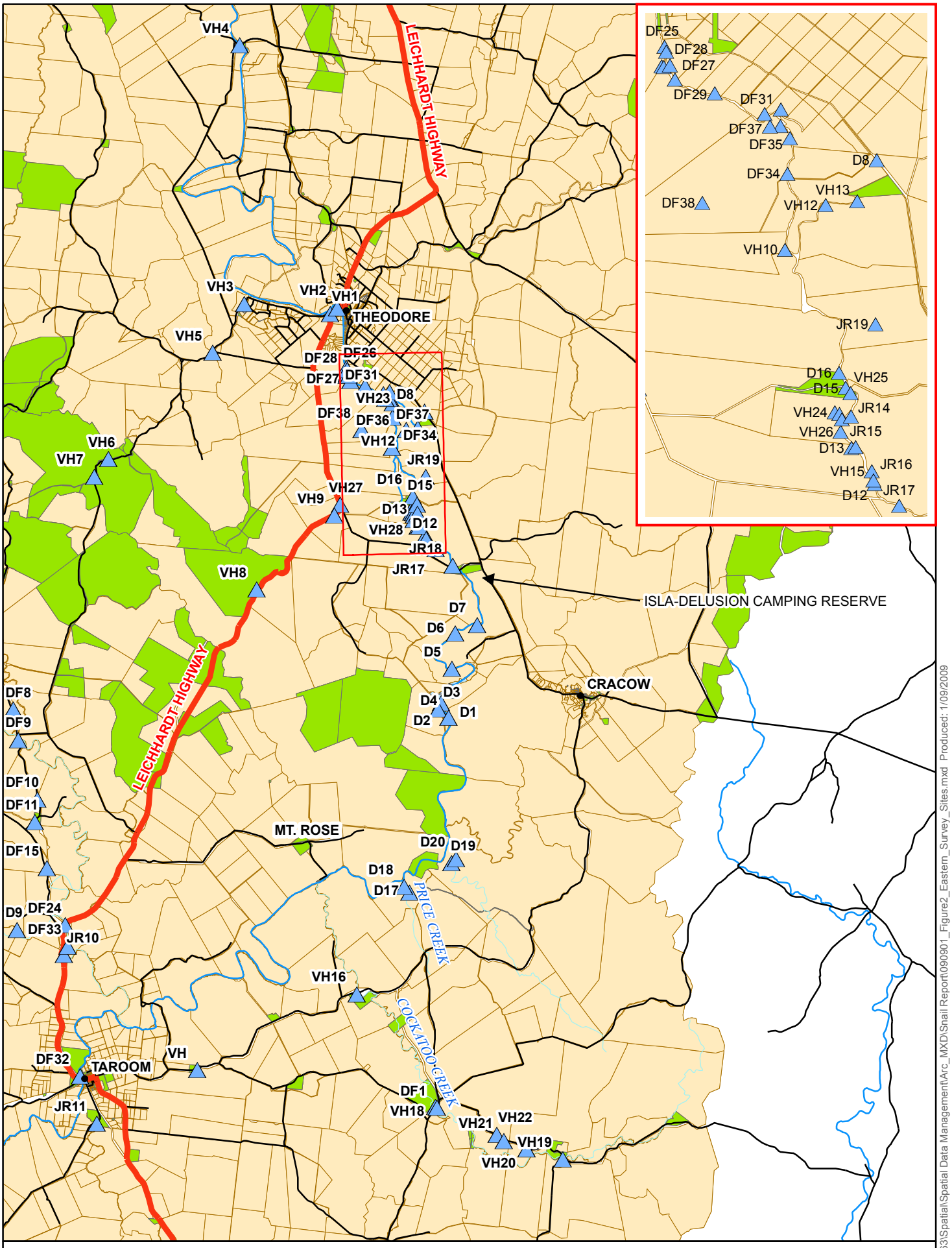

LEGEND

- Localities
- Sites
- Major Roads
- Minor Roads
- Rivers
- Creeks

Cadastre

- Reserves
- Water Reserves
- Other Tenures

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Kilometres

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Datum: GCS GDA94

NATHAN DAM - BOGGOMOSS SNAIL SURVEY

Figure 3 - Location of Eastern Survey Sites

Project Number: QE09463

SINCLAIR KNIGHT MERZ SKM

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3.3. Presence of Boggomoss Snails

Live specimens of the Boggomoss Snail (total of 32 snails) were found within eleven sites and shells were collected from a further four sites (**Figure 4**). Live snails were found within the riparian zone of the Dawson River from Nathan Gorge to within approximately 10 km upstream of Theodore. However, live snails at Nathan Gorge were found within Cabbage Tree Creek some 300 m from the confluence with the Dawson River. Breeding populations, designated as such by the presence of adults and juveniles, were located at Isla-Delusion Camping Reserve / "Lagoona" and on "Southend", approximately 8 km downstream from Isla-Delusion. These localities are characterised by wide, relatively intact palm forests on low lying land around the Dawson River.

Most snails were collected from within 50 m of the banks of the Dawson River within open to closed forests of *Livistona nitida*. Typical microhabitats included under deep piles of decaying palm fronds (to 20 cm depth), under rotting logs and in humus at the base of *Eucalyptus tereticornis*, *L. nitida* and occasionally Sandpaper figs (*Ficus opposita* and *F. coronata*). Snails were collected individually or occasionally within small groups of up to three snails and across a range of size classes from hatchlings of 2 mm shell diameter to adults up to 30 mm diameter.

A summary of the number of Boggomoss Snails found during the survey and the area of habitat in which they were found are presented in **Table 1**. The presence of other snail species found during the searches is presented on a site-by-site basis in **Appendix B**.

Table 1 Summary of Boggomoss Snails Found

Site	Site Description	Area of Habitat (ha)	Number of Live Snails	Number of Shells
D15 VH25 D16	""Southend""	10.31	1 adult	-
			2 adult	2 adult
			1 adult	3 adult
JR16	"Southend"	8.84	1 adult	-
D13	"Southend"		-	1 adult, 1 sub-adult
VH24	"Southend"	0.21 (two patches)	2 adult	5 adult
D14	"Southend"	0.11	2 adult, 4 sub-adult	6 adult, 6 sub-adult
DF35	"Kia Ora"		-	2 adult
DF36 DF37	"Kia Ora"	3.54	1 adult, 1 sub-adult	2 adult
			1 adult	-
JR18 JR19	Isla-Delusion Camping Reserve / "Lagoona"	14.40	2 adult, 1 sub-adult	5 adult
			8 adult	13 adult
D11	Nathan Gorge	2.20	3 adult, 1 sub-adult	2 adult
D4	"Gyranda"	7.02	1 adult	3 adult
D2	"Gyranda"		-	1 adult

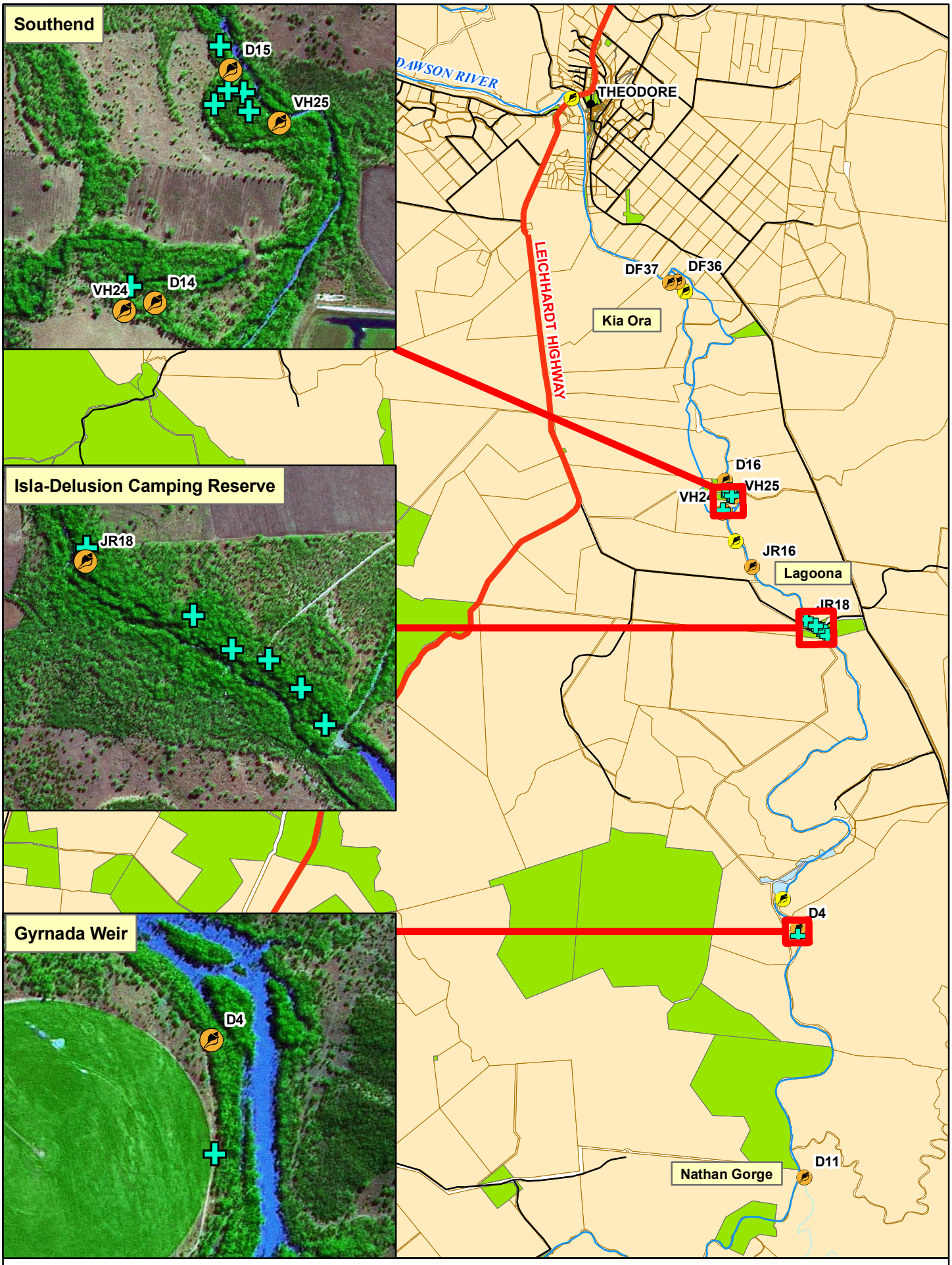
Site	Site Description	Area of Habitat (ha)	Number of Live Snails	Number of Shells
VH2	Leichhardt Highway crossing of the Dawson River		-	1 adult
TOTAL		**46.97**	**32 live snails**	**53 shells**

3.3.1. Population Estimates

Snail density estimated were obtained from 24 transects (240, 1m x1m search quadrats) at the following habitat patches:

- lower terrace on Dawson River upstream of Gyranda Weir (2 transects at site D4);
- lower terrace on Dawson River at Isla-Delusion Camping Reserve and the adjacent "Lagoona" property (10 transects at site JR19);
- an ephemeral wetland on the "Southend" property (2 transects at site VH24/D14); and
- a palm forest on Dawson River Anabranch at "Southend (10 transects at VH25)".

Population estimates were not undertaken for five sites at which the snail was found primarily due to the restricted area of habitat at some locations. In these areas it was not possible to erect a 100m transect.


Southend
D15
VH25
VH24
D14
Isla-Delusion Camping Reserve
JR18
Gyrnada Weir
D4
DAWSON RIVER
THEODORE
LEICHHARDT HIGHWAY
DF37
DF36
Kia Ora
D16
VH25
VH24
JR16
Lagoona
JR18
D4
Nathan Gorge
D11
LEGEND
Localities
Transects
Live Snails (no transects completed)
Shells
Major Roads
Minor Roads
Rivers
Creeks
Land Use
Reserves
Water Reserves
Other Tenures
N
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Kilometres
Scale - 1:250,000 at A4
Datum: GCS GDA94
NATHAN DAM - BOGGOMOSS SNAIL SURVEY
Figure 4 - Results of Snail Survey
Project Number: QE09463
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SKM
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Table 2 contains an estimate of the density of live snails within each patch. The average density of snails across all transects was found to be **0.071** snails per m^2 or 710 snails per hectare.

- **Table 2 Density of Boggomoss Snails within transect sites**

Locality	Habitat Patch (m^2)	Live Snails Found	Area searched on transects (m^2)	Snail Density (snails/m^2)	Patch population estimate with standard errors
"Gyranda" (upstream)	70,164	1	20	0.05	3,508 (2,204 – 4,811)
Isla-Delusion Camping Reserve / "Lagoona"	143,986	8	100	0.08	11,519 (8,844 – 1,4193)
"Southend" (wetland)	1,073	6	20	0.3	322 (302 – 342)
"Southend" (palm grove)	103,071	2	100	0.02	2,061 (147 – 3,976)
			TOTAL		**17,410 (11,497 – 23,323)**

Live snails were found within a total area of 47 ha of habitat. Extrapolating the density of 710 snails/ha gives a population estimate of 33,370 snails. However, the approach makes the assumption that the Boggomoss Snail occurs at a uniform density throughout available habitat and this is not the case. Patch specific snail densities were multiplied by patch areas to give a revised estimate of **17,410 snails** ± 5,913 snails (a range of 11,497 to 23,323 snails). This estimate does not include the populations at or near Mt Rose nor from the new sites from this survey which were not included within the transect surveys.

The findings of this study build on the results of previous field investigations, particularly those published in the Recovery Plan (Stanisic 2008) and by BAAM (2009). A summary of the population attributes presented in each document is provided in **Table 3**.

- **Table 3 Summary of Population Attributes from published reports**

Population Attributes	Status in Recovery Plan	Revised Status (BAMM 2009)	Revised Status (this report plus previous)
Number of known sites	2 sites	5 sites (3 new sites)	11 sites (10 new sites)
Area of suitable habitat	▪ 45.5 ha (Isla-Delusion Camping Reserve) ▪ 0.5 ha (Mt. Rose Station)	▪ 44.5 ha (Isla-Delusion Camping Reserve) ▪ 0.75 ha (Mt. Rose Station)	▪ 44.5ha (Isla-Delusion Camping Reserve) ▪ 0.75 ha (Mt. Rose Station) ▪ 0.11 ha ("Southend") ▪ 7.02 ha ("Gyranda") ▪ 10.31 ha (Isla-Delusion Camping Reserve)
Distribution (length of river)	60 km	60 km	90 km

Population Attributes	Status in Recovery Plan	Revised Status (BAMM 2009)	Revised Status (this report plus previous)
Population Estimate by site	▪ 100 (Mt Rose Station) ▪ 500 (Isla-Delusion Camping Reserve)	▪ >350 (Mt Rose Station) ▪ <??? (Isla-Delusion Camping Reserve)	▪ >350 (Mt Rose Station) ▪ 2,383 ("Southend") ▪ 3,508 ("Gyranda") ▪ 11,519 (Isla-Delusion Camping Reserve)
Total overall population estimate	**600**	**<850**	**17,410**

Population estimates from the Isla-Delusion Camping Reserve are markedly increased relative to previous surveys. Previous surveys (BAMM 2009) located only 3 sub-adult snails in 16 hours of searching while Stanisic (1996) recorded 6 live snails (2 adults and 4 sub-adults). The current survey recorded 8 snails from 100, 1m x 1m plots at this location. Hatchling, sub-adult and adult snails were recorded from the continuous habitat area downstream of Isla-Delusion Camping Reserve, where habitat extends into the property "Lagoona". The Isla-Delusion Camping Reserve appears to support a stable, breeding population of Boggomoss Snails.

Similarly, transect data from an ephemeral wetland on "Southend" indicate a reasonable abundance of Boggomoss Snails across all age classes (hatchling, sub-adult and adult snails), indicating that a stable, breeding population is present at this location.

BAMM (2009) reported that:

"the species may exist as scattered individuals along the stream-bound riparian habitats of the nearby Dawson. This habitat does not provide the accumulation of the moist dense litter found on the boggomosses probably because of the effects of intermittent flooding. (This may also account for the lack of dead shells). They are however, moist habitats with scattered fallen logs which provide the snail with shelter and foraging sites."

The pattern of distribution observed during the current survey indicates that the species forms stable populations in habitats associated with the Dawson River Floodplain, including sites on higher terraces, ephemeral wetlands and broad alluvial (but not strictly riparian) woodlands.

3.3.2. Assumptions

Several assumptions have been made for the estimation of population sizes:

- The Boggomoss Snail is a cryptic species that appears to be sparsely distributed (compared with other common snail species found during the survey) within its range. The survey was

also conducted during the driest season of the year and may have affected the detectability of individuals (i.e. snails may retreat to moist refuges in dry seasons, which are unable to be searched). Follow up surveys should be completed during or immediately after significant rainfall events in order to revise population estimates.

- Habitat patches were mapped conservatively and did not extend more than 50 m from the river edge, including anabranches and overflow areas. It is likely that some suitable microhabitat occurs outside this zone; however, it is considered to be at a much lower density than microhabitat adjacent to the river bank.
- The population estimates have been calculated based on the area of habitat in which live snails were found. The estimates do not include habitats in which shells were found nor those sites that are yet to be searched. This is consistent with the methodology used to estimate populations at Mt. Rose Station (BAAM 2009).
- Population estimates on "Southend" within the ephemeral wetland are likely to be over-estimated due to the targeted methodology in which 20 suitable microhabitats were searched. Areas outside these microhabitats are unlikely to contain live snails at similar densities.

4. Discussion and Conclusion

4.1. Distribution and Habitat Preferences

Populations of the Boggomoss Snail were recorded from 11 sites during the current survey where the species has not previously been recorded. All sites are located on the Dawson River floodplain on both east and west facing banks other than one site on Cabbagetree Creek, a tributary of the Dawson River downstream of the proposed Nathan Dam.

Single, mature (large) snails were found on several occasions on the higher terraces of the Dawson River, in association with *Livistona nitida*. These sites were notably drier than those occupied by hatchling and sub-adult snails. The species had previously been recorded from eucalypt woodland dominated by *L. nitida* at Isla-Delusion Camping Reserve and as dead specimens downstream of Nathan Gorge. This survey confirms that the species is strongly associated with this vegetation type.

Not all stands were found to be occupied by the species, and overall canopy cover (of palms, eucalypts or a combination of both) appears to be an important determinant of suitability. Sites with a noticeably higher canopy cover and increased shading appear to support higher densities of the Boggomoss Snail. Time since fire and intensity of fire are also seemingly important factors, with recently burnt sites found to lack the species. Invasion of potential habitat by *Megathyrsus maximus* may also limit habitat suitability by reducing the accumulation of leaf litter and increasing fire fuel loads and (subsequently) fire intensity.

Boggomoss Snails were recorded from a range of microhabitats including deep leaf litter at the base of Eucalypts and Carnarvon Palm, under logs, under accumulations of Carnarvon Palm Fronds, in leaf litter at the base of *Ficus opposita* and in leaf litter beneath other characteristically wet forest species such as Green Kamala (*Mallotus cloaxyloides*).

4.2. Population Estimates

The results of this survey indicate that the sites which contain the most robust populations of the Boggomoss Snail downstream of the proposed Nathan Dam are:

- Isla-Delusion Camping Reserve (particularly downstream of the road crossing); and
- “Southend”, where the species is associated with ephemeral wetlands with narrow fringing vegetation and adjacent dense palm forests.

Although the estimated snail population within habitat at Gyranda Weir is larger than that of "Southend", the habitat appears to be degraded due to impacts from cattle and the riparian vegetation is narrow at this site.

4.3. Potential Translocation Sites

The revised population estimates within "Southend" and Isla-Delusion Camping Reserve indicate that these sites could be suitable as translocation sites for the Mt. Rose Station boggomoss populations. These sites appear to contain stable, breeding populations of the Boggomoss Snail due to the presence of a range of adult and sub-adult live individuals and shells. These sites occur within or adjacent to larger habitat patches and with proper management of threatening processes (e.g. fire, cattle trampling, weed control and revegetation) these sites could support translocated populations of snails in the long term.

This study did not search all potential habitat patches on the Dawson River within the species' distribution; however, it was noted that several large, intact habitat patches occur downstream of the Isla-Delusion Camping Reserve. Such patches may also be suitable as translocation sites.

4.4. Conclusion and Recommendations

The revised population estimate of **17,410** Boggomoss Snails across a relatively large number of sites has significant implications for the conservation management of the species. The species occurs at a relatively low density across a broader geographic area than previously anticipated and additional stable, breeding populations have been located. It is also highly likely that further populations exist in suitable habitat that has been identified but not yet surveyed. Patches of likely habitat vary from quite substantial areas to small remnants. Further effort to access these areas would increase the certainty of distribution and abundance estimates, particularly if conducted during wetter conditions.

The methodology used by Stanisic (BAAM 2009) to estimate populations at Mt. Rose Station was different to that used here. The Mt Rose estimate should be revised using the same methodology to ensure consistent comparisons.

5. References

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Appendix A Sample Search Pro Forma

Boggomoss Snail Survey	**Date**	
Site / Property Name		
Team / GPS Waypoint		
Coordinates		
Search time		
Photo No.		
Site Description		
Vegetation		
Canopy / Mid stratum		
Ground stratum		
Microhabitat structure		
Snails found		
Species (Number [live] and [dead]		
Significant habitat characteristics		

Appendix B Site Descriptions

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Gyranda (east bank)	D1	S: 25°17'27.2" E: 150°10'16.1"	1	Sparse woodland with Livistona nitida. Low-lying, adjacent to impoundment.	*Eucalyptus tereticornis, Corymbia tessellaris. Livistona nitida*. Medium to sparse coverage.	Rushes in moist area, pasture grasses up slope.	Fallen timber. Sparse palm frond depth.	Aquatics	Moist with some frond litter under palms
Gyranda (east bank)	D2	S: 25°18'07.5" E: 150°09'46.8"	1	Linear Livistona nitida forest on low terrace.	Very sparse *Eucalyptus tereticornis. Livistona nitida* dense to moderate.	Grassy patches, palm frond litter.	Minimal leaf litter depth. Logs present.	*Adclarkia dawsonensis* x 1 (dead). *Xanthomelon distractum* x 2 (dead)	
Gyranda (west bank)	D3	S: 25°18'27.6" E: 150°09'35.1"	1	Very open forest with dense Livistona nitida forest on lower terrace of river	Open forest / woodland of *Eucalyptus tereticornis, Corymbia tessellaris* and dense mid-story of *Livistona nitida.*	flood debris (logs and palm fronds), grasses up slope.	Good depth of leaf litter (fronds). Portions inundated.	*Xanthomelon distractum* x 1 (dead), Undescribed sp. x 1 (live) x 4 (dead), *Adclarkia dawsonensis* x 2 (dead)	Moist litter
Gyranda (west bank)	D4	S: 25°18'55.7" E: 150°10'12.2"	2	Open forest with Livistona nitida understory	*Eucalyptus tereticornis, Corymbia tessellaris.* Dense coverage of *Livistona nitida*.	Debris. Grass up slope.	Good leaf litter, logs present and a sheltered slope.	*Adclarkia dawsonensis*) x 3 (dead) and x 1 (live). Undescribed sp. x 1 (live) (includes transect data)	
Gyranda (east bank north of weir)	D5	S: 25°16'14.8" E: 150°10'27.6"	1	Open forest with moderate to dense palm on lower terrace of river.	*Eucalyptus tereticornis. Livistona nitida* with *Melaleuca viminalis* and *M. bracteata.*	Dense grass patches even on lower slopes, dense leaf litter under palm groves.	Good in patches. Narrow strip.	*Adclarkia dawsonensis* x 1 (dead)	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Gyranda (east bank north of weir)	D6	S: 25°14'18.3" E: 150°10'43.0"	1	Vegetated flood out from main river channel.	*Eucalyptus tereticornis. Livistona nitida* with *Ficus opposita* and *Melaleuca bracteata* in lower lying area.	Palm frond litter, grasses up slope.	Good depth of leaf litter, logs.	none	
Gyranda (east bank)	D7	S: 25°13'51.4" E: 150°12'03.1"	1	Confluence of small tributaries with river. Large expanse of forest.	Woodland of *Eucalyptus tereticornis.* Dense *Livistona nitida* forest with *Ficus opposita* present.	Dense palm frond layer, few grass patches.	Good dense litter and logs.	*Figuladra mattea* numerous (live and dead).	
Theodore - Cracow Rd	D8	S: 25°02'01.5" E: 150°09'08.7"	1	Remnant brigalow patch in road reserve	*Acacia harpophylla* with occasional *Eucalyptus coolibah.* Some associated shrubs, but mainly open.	Leaf litter and grassy clumps	Good ground debris, leaf litter, logs	*Xanthomelon pachystylum* x 2 (dead), *Scagacola brigalow* x 3 (dead), *Figuladra mattea* x 6 (dead), Undescribed sp. x 3 (dead)	
Palm Vista	D9	S: 25°30'05.5" E: 149°43'43.8"	1	Palm forest on channel country	*Eucalyptus tereticornis* woodland. *Livistona nitida* moderately dense.	Grass tussocks. Palm litter around base of trees.	Good in patches.	*Xanthomelon distractum* x 2 (dead), Undescribed sp. x 5 (dead) x 2 (live).	
Palm Vista	D10	S: 25°29'35.1" E: 149°41'21.0"	2	Channelised creek with fringing palm forest	*Eucalyptus tereticornis* woodland to open woodland with dense patches of *Livistona nitida*.	Dense frond litter with grassy tussocks at edge of patches.	Good depth of leaf litter but very dry, cracking clay soils.	*Figuladra mattea* x 5 (dead). *Xanthomelon distractum* x 1 (dead). Undescribed sp. x 1 (live) and x 2 (dead)	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Nathan Gorge (Cabbagetree Creek)	D11	S: 25°42'83.6" E: 150°17'07.9"	1	Depauperate rainforest on terraces in gorge	*Eucalyptus tereticornis. Livistona nitida* and rainforest mid-storey.		Deep leaf litter, deep, moist humus.	*Xanthomelon distractum* x 2 (dead), Undescribed sp. x *5* (dead) x 3 (live). *Adclarkia dawsonensis* x4 (live) (1 sub-adult). x2 (dead)	
Southend	D12	S: 25°09'09.0" E: 150°09'05.3"	1	Anabranches on Dawson River	*Eucalyptus tereticornis* open forest. *Livistona nitida* moderate to dense. *Melaleuca viminalis, Ficus sp* present.	Lomandra longifolia	Poor depth of leaf litter, some palm piles, few logs.	*Figuladra mattea* x 1 (dead). *Xanthomelon pachystylum* x 1 (dead)	
Southend	D13	S: 25°08'21.5" E: 150°08'35.2"	1	Depauperate palm forest on terraces	*Eucalyptus tereticornis* open forest. *Corymbia tessellaris* up slope. *Livistona nitida* (dense to moderate), Ficus sp. *Melaleuca viminalis* at river bank.	Grass, ground debris.	Some good piles of leaf litter, but generally poor overall. Generally drier substrate.	*Figuladra mattea* x 10 (dead) and x 10 (live). *Adclarkia dawsonensis* x 2 (dead) (1 sub-adult).	
Southend	D14	0211315 7218007	2	Results from this site included under VH24					
Southend (northern portion)	D15	S: 25°07'01.9" E: 150°08'27.6"	1	Linear fragment of Livistona nitida forest on high terrace.	*Eucalyptus tereticornis* open forest. *Livistona nitida* dense. Occasional *Ficus opposita.*	Very grassy, dense litter in patches	moderate depth of litter at base of trees	*Adclarkia dawsonensis* x 1 (live adult). *Figuladra mattea* x 6 (live) and 5 (dead).	very dry in patches, but some moisture in snail site

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Southend (northern portion)	D16	S: 25°06'42.5" E: 150°08'18.9"	1	Depression setback from main river channel	*Eucalyptus tereticornis* open forest. *Livistona nitida* dense. Sparse *Ficus opposita*. Occasional *Lophostemon suaveolens.*	grassy with dense litter in patches.	good depth of litter and flood debris	*Adclarkia dawsonensis* x 1 (live) and x 3 (dead). *Figuladra mattea* x 5 (live) and x 5 (dead).	Very shady site. Good depth of litter.
Price Creek	D17	S: 25°28'32.1" E: 150°07'36.5"	2	Livistona nitida / Eucalyptus camaldulensis woodland on sandstone spring	*Livistona nitida* / Acacia species		well developed leaf litter. Abundant logs, rocks and living cover	*Xanthomelon pachystylum* x 1 (live). Undescribed sp. x 2 (dead)	Absence of figs
Price Creek	D18	S: 25°28'12.9" E: 150°07'17.3"	1	small patches of palms on first terrace above creek	*Eucalyptus tereticornis* woodland with *Eucalyptus coolibah Livistona nitida*, but absence of *Ficus* sp.	Lomandra longifolia in patches. Litter	Good depth of leaf / palm litter and soil moisture high	*Scagacola brigalow* x 1 (dead)	
Cabbagetree Creek	D19	S:25°26'57.2" E: 150°10'10.9"	4	First terrace above creek	*Eucalyptus tereticornis* open forest. *Livistona nitida* dense to moderate, *Mallotus philippensis, Hovea* sp. upslope and some *Ficus sp*.	woody debris, grass tussocks, ferns	good deep litter	Undescribed sp. x 1 (dead)	
Cabbagetree Creek	D20	S: 25°26'43.7" E: 150°10'28.8"	1	Tall riparian woodland of *Eucalyptus tereticornis* and *Livistona nitida*	*Eucalyptus tereticornis*. *Livistona nitida*. *Hovea* and *Acacia* species	Some grasses	Deep leaf litter	Undescribed sp. x 6 (dead).	*Lophostemon suaveolens* appearing low density
Dawson River Anabranch (Leichhardt Highway)	VH1		1	Riparian tall open forest	*Eucalyptus tereticornis, Corymbia sp, Livistona nitida, Ficus opposita.*	Leaf litter, tall grassland.	Palm fronds, bark, logs, leaf litter - dry	*Figuladra mattea* x 3 (dead)	dry substrate

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Dawson River Anabranch (Leichhardt Highway - near weir)	VH2		1	On Dawson, upstream of weir	*Eucalyptus tereticornis, Melaleuca quinquenervia* and some *Ficus opposita.*	Lomandra sp., log piles, grassland		*Figuladra mattea* x 3 (dead), Undescribed sp. x 1 *Adclarkia dawsonensis* x 1 (dead), Aquatic x 5 (dead)	
Roadside (Beckers Rd)	VH3		1	Roadside remnant of Acacia harpophylla	*Acacia harpophylla, Eucalyptus coolibah*	Leaf litter, *Acacia sp.*		*Figuladra mattea* x 3 (live) and x 3 (dead). *Scagacola brigalow* x 11 (dead), Undescribed sp. x 1 (dead)	
Kiandra River Crossing (Dawson River)	VH4		1	Riparian tall open eucalypt woodland	*E. tereticornis, Melaleuca Sp*	Tall grass	wood debris	*Figuladra mattea* x 1 (dead), aquatic x 3	
Corner of Glenmoral - Roundstone Rd and Sawmill Rd	VH5		0.5	Riparian open eucalypt forest	*Eucalyptus tereticornis, Melaleuca sp, Ficus opposita*	Short grass and sand	Grazed/ trampled by stock	0	
Isla Gorge (National Park)	VH6		1	Open eucalypt woodland on ridge top	*Eucalyptus crebra*	Grass	Lots of tree branches, logs, recent fire	0	Sandstone soils, very dry, ridge top
Isla Gorge (gully)	VH7		1	Tall open eucalypt woodland - gully between ridges	*Eucalyptus tereticornis, Eucalyptus crebra.*	Grass	branches, logs, some leaf litter	*Figuladra mattea* x 2 (live) and x 8 (dead), *Scagacola brigalow* x 1 (dead)	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Isla Gorge (down gully, Leichhardt Highway	VH8	0800230 7210231	1	Tall open eucalypt forest within gully at Isla Gorge - remnant	Corymbia citriodora, Ecucalyptus melanophloia, Acacia sp.	Short grass	thick leaf litter, rocks, logs	Undescribed sp. x 1 (dead)	Remnant forest, dry, deep leaf litter
Roadside remnant (Leichhardt Highway)	VH9	0203472 7217693	1	Acacia harpophylla on road side	*Acacia harpophylla*	Log piles, bark forms carpets, leaf litter	Abundance of woody debris from surrounding clearing, leaf litter, grass surrounds patches	*Figuladra mattea* x 1 (live), x 7 (dead adult) and x 2 (dead juvenile). *Xanthomelon distractum* x 1 (dead)	Deep leaf litter, bark and logs, dry
Wiltony (upstream)	VH10	0209334 7224575	1	Dawson river riparian	*Eucalyptus camaldulensis, Livistona nitida, Eucalyptus coolibah, Corymbia tessellaris*	grass, palm fronds, leaf litter	palm fronds, large tree stumps, leaf litter	*Figuladra mattea* x 5 (live) and x 1 (dead)	Steep gradient
Wiltony (downstream)	VH11	0209334 7224575	1	Dawson river riparian	*Eucalyptus camaldulensis, Livistona nitida, Ficus opposita, Melaleuca linariifolia, Eucalyptus coolibah*	palm fronds, large tree logs, leaf litter		*Figuladra mattea* x 3 (dead adult), *Xanthomelon distractum* x 1 (dead adult), *Scagacola brigalow* x 1 (dead sub-adult)	Steep gradient
Acacia (Dawson River Anabranch)	VH12	0209333 7226430	0.6	Livistona nitida forest	*Livistona nitida, Eucalyptus camaldulensis, Ficus opposita, Melaleuca linariifolia (on river edge), Angophora sp., Corymbia tessellaris, Eucalyptus coolibah*	palms fronds, grass, Lomandra sp. Bare soil	cattle access, absence of mature wood debris, some palms fronds.	*Figuladra mattea* x 1 (dead)	cattle grazing and access to river, some woody debris

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Acacia (Dawson River Island)	VH13	0211965 722660	1	Island between anabranch and river Riparian	*Livistona nitida, Eucalyptus camaldulensis, Ficus opposita, Melaleuca linariifolia*	leaf litter, logs, palm fronds, grass under figs, Lomandra longifolia	limited cattle access	*Figuladra mattea* x 2 (dead adult), *Xanthomelon distractum* x 1 (dead adult), Aquatic x 1 (dead)	
Lagoona	VH14	0214702 7213976	1	Riparian remnant Dawson River	*Livistona nitida, Eucalyptus camaldulensis, Ficus opposita*	*Megathyrsus maximus, Lomandra sp.*	palm fronds, limited leaf litter and logs	*Figuladra mattea* x 2 (dead)	Steep gully, wide corridor, cattle fenced out
Lagoona	VH15	0214699 7213979	1	Eucalypt woodland on flood terrace adjacent to Dawson River	*Eucalyptus camaldulensis, Eucalyptus coolibah, Eucalyptus populnea, Acacia sp., Livistona nitida*	grass	logs, grass	*Figuladra mattea* x 6 (live (2 adult, 2 sub-adult, 2 juvenile)) and x 1 dead. Aquatic (unknown) x 2 (dead)	flood terrace, wide corridor of remnant forest, cattle fenced out
Cockatoo Creek (Cracow Road eastern side)	VH16	0205739 7168928	1	*Eucalyptus tereticornis* riparian forest	*Eucalyptus tereticornis, Eucalyptus populnea*	grass	Logs and bark, moist soil	*Figuladra mattea* x 1 (live adult) and x 1 (dead). Undescribed sp. x 1 (live)	Cattle access
Cockatoo Creek (Cracow Road western side)	VH17	0205739 7168928	1	*Eucalyptus tereticornis* riparian forest	*Eucalyptus tereticornis, Eucalyptus populnea, Melaleuca linariifolia, Lycophyllum sp., Leptochilus sp.*	sedges at river edge		*Figuladra mattea* x 1 (dead)	
Cockatoo Creek (Eidsvold - Taroom Road)	VH18	0213749 7157454	1	Riparian vegetation fringing steep gully of creek	*Eucalyptus tereticornis, Angophora sp., Eucalyptus populnea, Melaleuca linariifolia*	Themeda sp., Megathyrsus maximus, grass, sedges near edge of standing water	Mainly grass, logs, moist under logs	*Figuladra mattea* x 2 (live) and x 3 (dead)	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Creek with sandstone cliffs	VH19	0226728 7152098	1	creek on rocky alluvium/sandy	*Eucalyptus tereticornis, Melaleuca linariifolia, Acacia pendula*	*grass, Typha* sp, *Eleocharis* sp, *Schoenoplectus* sp.	wood debris from flood waters, rocks and logs	*Figuladra mattea* x 5 (live) and x 2 (dead) and x 8 (dead juvenile). Aquatic x 1 (dead).	water flowing, floodplain, sandstone cliff on one side
Unnamed creek	VH20	0223045 7153120	1	Riparian open forest	*E. tereticornis, Angophora paludosa, C. cristata, Geijera sp.*	*Heteropogon, chloris,* grasses	logs, moist under logs with wood fungi	Undescribed sp. x 1 (sub-adult)	
Brigalow	VH21	0220704 7153979	1	Brigalow adjacent to creek line with *Casuarina cristata* on alluvium	Acacia harpophylla, *C. cristata*	No grass	logs and leaf litter	*Figuladra mattea* x 1 (live)	Thick leaf litter
Brigalow	VH22	0219989 7154626	1	Brigalow on creek	*Acacia harpophylla, E. populnea, Geijera parvifolia, E. mitchellii*	logs, leaf litter, grass	Moist leaf litter, logs	*Lynfergusonia taroomiana* x 1 (live), Undescribed sp. x 5 (dead)	moist substrate
Brigalow	VH22	0791990 7161628	0.6	Brigalow	*Acacia harpophylla, E. populnea, Lycophyllum, Geijera parvifolia* (understory)	bare dirt	dirt, some leaf litter, logs		Dry
Dawson River	VH22	0204609 7231936	1	Dawson River Anabranch - riparian	*Melaleuca linariifolia, E. camaldulensis, Acacia Sp., Melia azedarach, Ficus opposita,*	Grass and sedge	logs, leaf litter, dried mud	*Figuladra mattea* x 1 (live juvenile) and x 5 (dead - 2 adults - 3 juveniles). Aquatic snails x 3 (dead)	cattle trampled, very dry
Dawson River	VH23	0204690 7231902	0.6	Dawson river riparian (between river and Anabranch)	*E. camaldulensis, Melaleuca linariifolia, Ficus opposita, Livistona nitida*	leafs, logs, palm fronds - no grass	very dry	*Figuladra mattea* x3 (live) and x 4 (dead - sub adult)	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Southend	VH24	0211315 7218007	2	Billabong edged with gums and palms	*E. camaldulensis, Livistona sp., E. coolibah, Lophostemon suaveolens*	grass, logs and sticks, leaf litter, palm fronds	Deep leaf litter and logs (some burnt) surrounding billabongs	*VH24* *Adclarkia dawsonensis* x 2 (live - adult) and x 5 (dead). *Figuladra mattea* x 1 (dead) *D14* 6 x live *Adclarkia dawsonensis* (2 adults, 4 sub-adults), x 12 dead *Adclarkia dawsonensis*	Dry billabong, but still moist under logs and deep leaf litter
Southend	VH25	0211888 7218804	2	Dawson River riparian - Remnant *Livistona* forest with scattered river gums	*E. camaldulensis, Livistona sp, Ficus opposita*	*Megathyrsus maximus*	palm fronds and leaf litter under Ficus and some logs	*Figuladra mattea* x 8 (dead) and x 4 (live). *Adclarkia dawsonensis* x 2 (live) x 2 (dead) (includes transect data)	Remnant, no cattle access, pig tracks, grass infesting the site
Southend	VH26	0211552 7217232	1	Dawson River riparian - thin corridor	*E. camaldulensis, Melaleuca linariifolia, Ficus opposita, E. coolibah, Livistona nitida*	*Megathyrsus maximus*, *Oplismenus imbecillis*	grass, logs, leaf litter, palm fronds (some) - sandy soil	*Figuladra mattea* x 1 (dead) and x 1 (live)	
Brigalow remnant, Leichhardt Highway	VH27	0204054 7218795	0.5	Brigalow on roadside adjacent to creek	*Acacia harpophylla, Amyema quandang*, *E. populnea*	*Megathyrsus maximus*, *Paspalum sp.*	Some leaf litter/logs, unable to access habitat patch, only edge	*Figuladra mattea* x 1 (live - adult) and x 1 (dead-juvenile). *Scagacola brigalow* x 1 (dead)	
Southend	VH28	0211580 7217726	0.5	Dawson River Riparian	*E. camaldulensis, E. coolibah, Livistona nitida, Ficus opposita,*	*Megathyrsus maximus*	logs, leaf litter, grass	*Figuladra mattea* x 1 (live)	cattle access, pig disturbance

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Southend	VH29	0211479 7217947	1	Ephemeral wetland	*E. camaldulensis, E. coolibah, Livistona nitida*	*Megathyrsus maximus,* leaf litter	logs, leaf litter, palm fronds (surrounding old water line)	*Figuladra mattea* x 2 (dead)	no standing water present, cattle access - moist under leaf litter
Cockatoo Creek (off Nathan Road)	DF1	0213890 7157357	1		*E. tereticornis, Corymbia* sp., *Melaleuca sp.*		logs	*Figuladra mattea* x 1 (dead), Aquatic x 2 (dead)	
Coorada - Fitzroy Development Road	DF2	S:24°58'40" E:149°30'47"	1	Road reserve next to State Forest. No discernable riparian zone, but *E. tereticornis* present	*E. tereticornis, C. tessellaris*	tussock grasses, no shrubs	few fallen logs and piles of bark		
State Forest (near Reedy Creek)	DF3	S:25°01'49" E:149°27'52"	1	Incised creek (no water)	*E. tereticornis,* Ironbark*, C. cunninghamiana, Melaleuca* sp., *Syncarpia* sp.	grazed tussock grasses, Lomandra sp. in creek bed	fallen logs, thin layer, leaf litter	*Xanthomelon distractum* x 7 (live) and x 7 (dead).	large rotting logs on higher terraces
State Forest (Reedy Creek Rd)	DF4	S:25°01'50" E:149°26'39"	1	Ephemeral wetland	*E. tereticornis, Corymbia sp., Lophostemon suaveolens, Melaleuca* sp. shrubs / low lying trees.	grazed tussock grasses	abundance of fallen debris, good leaf litter around the base of gums	*Xanthomelon distractum* x 4 (live) and x 3 (dead).	
State Forest (Reedy Creek Rd)	DF5	S:25°02'31" E:149°23'46"	1	degraded creek with remnant trees.	*E. tereticornis, C. tessellaris,* Ironbark, Acacia regrowth	grazed tussock grasses	Poor. Few fallen logs good bark piles around base of trees	*Xanthomelon distractum* x 3 (dead)	Snails found under large rotting logs
Pesko State Forest (Reedy Creek Rd)	DF6	S:25°04'52" E:149°21'34"	1	Creek with sandstone escarpment (minor), but cattle impacts	*E. tereticornis, Corymbia sp.,* Ironbark above bank, *M. viminalis*	Native grass, grazed tussocks	fallen logs, but some overgrazing areas.	*Xanthomelon distractum* x 1 (dead)	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Ghinghinda (Taroom Rd)	DF7	S:25°07'29.6" E:149°43'00"	1	disturbed creek	*E. tereticornis, C. cunninghamiana, Geijera parvifolia, C. tessellaris*	grazed grass tussocks	Poor. Some fallen logs and log piles in cxreek bed	*Figuladra mattea* x 3 (dead) and x 4 (live - 1 sub-adult)	
Ghinghinda (Taroom Rd)	DF8	S:25°17'56" E:149°43'49"	1	road reserve adjacent to creek	*E. tereticornis,* juvenile *E. tereticornis* and other eucalypts.	grassy, sandstone outcrops	poor. Few log, but bark at base of trees	*Figuladra mattea* x 1 (live) and x 6 (dead)	
Palm Tree Creek (on Ghinghinda - Taroom Rd) Stanisic Site	DF9	S:25°19'38" E:149°44'04"	1	disturbed creek, sandy bed and banks. Grassy woodlands.	*E. tereticornis, Corymbia sp., C. cunninghamiana, M. viminalis*	grass	levee banks, but few habitat logs	*Figuladra mattea* x 34 (live) and 5 (dead)	moist under bark on tree trunk and at base of trees
Unnamed creek on Ghinghinda - Taroom Rd	DF10	S:25°22'55.6" E:149°45'08"	1)	very disturbed *Eucalyptus populnea* / *Acacia harpophylla* community	*Eucalyptus populnea, Ironbark, Acacia harpophylla, Geijera parvifolia*	Grassy with bare ground	*Geijera parvifolia* forms a low shrub layer creating a sheltered ground habitat for accumulation of litter	*Xanthomelon pachystylum* x 1 (live), *Figuladra mattea* x 2 (live) and x 1 (dead)	
Reserve off Ghinghinda - Taroom Rd	DF11	S:25°24'09" E:149°44'58"	1	waterway floodplain	*E. tereticornis,* Ironbark on upper slope, some *A. harpophylla* on upper slope	grass	some logs, but mostly bark	*Xanthomelon pachystylum* x 1 (dead). *Figuladra mattea* x 2 (live) and x 1 (dead)	
Fitzroy Dev Rd (Turtle Creek)	DF12	S:25°08'06" E:149°33'48"	1	degraded creek-sandstone bed and banks	*E. tereticornis, C. cunninghamiana, M. viminalis*	grazed tussock grasses	logs, rocks, bark piles	*Xanthomelon distractum* x 4 (dead) and x 1 (live).	
Palm Tree Creek (Fitzroy Dev Rd)	DF13	S:25°12'21.6" E:149°34'09"	1	degraded creek	*E. tereticornis, C. cunninghamiana, M. viminalis,* juvenile eucalypts	grazed tussock grasses	poor, some logs, rocks, bark piles, debris piles from flood action	*Xanthomelon distractum* x 1 (dead)	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Ephemeral wetland adjacent to Fitzroy Dev Rd	DF14	S:25°15'52.8" E:149°35'47.9"	1	Ephemeral wetland with *E. coolibah* woodland	*E. coolibah, M. viminalis*	grazed tussock grasses	large logs (old dead trees)		
Unnamed Creek (on Fitzroy Dev Rd)	DF15	S:25°26'43.4" E:149°45'37"	1	degraded, small patch of riparian vegetation	*E. tereticornis, E. populnea,* Lysiphyllum sp*, A. harpophylla, G. parvifolia*	tussock grasses and rushes	good debris with logs, branches, no leaf litter	*Figuladra matte*ax 7 (dead) and x 2 (live - adult). *Scagacola brigalow* x 3 (dead)	degraded floodplain
Unamed Creek (on Fitzroy Dev Rd)	DF16	S:25°29'09" E:149°45'36.6"	1	palm tree linked waterway flowing from Lake Murphy	*E. tereticornis, E. cambageana (?), Livistona Sp*. with juvenile gums	tussock grasses	palm fronds, logs, leaf litter	*Figuladra mattea* >20 (live), >20 (dead). Aquatic snails present	few gum trees
Reserve on Robinson Rd (Robinson Creek)	DF17	S:25°29'43.1" E:149°33'10.7"	2	Robinson Creek in leased reserve	*E. tereticornis, C. cunninghamiana, G. parvifolia, M. viminalis, C. tessellaris*	grass cover	poor, but large fallen logs in grass	*Lynfergusonia taroomiana* x 1 (dead). *Scagacola brigalow* x 1 (dead). *Figuladra mattea* x 10 (dead) and x 5 (live). Undescribed sp. x 3 (live - juveniles)	
Lake Murphy Conservation Park	DF18	S:25°29'02" E:149°39'33"	1	flat woodland on sandy alluvium	*Corymbia sp.,* Ironbark (no midstory)	grass and herbaceous weeds	good - large fallen debris	*Lynfergusonia taroomiana* x 1 (live - juvenile) and x 20 (dead). Undescribed sp. x 1 (live)	
Lake Murphy CP (Robinson Creek)	DF19	S:25°29'18.8" E:149°39'37.7"	1	degraded creek with 5m high banks from bed - very steep in parts	*E. tereticornis, C. tessellaris*, Livistona nitida (sparse), *M. viminalis, C. cunninghamiana*	grass	Microhabitat absent on steep slopes. Debris in creek bad, but very clayey soil.	*Figuladra mattea* x 3 (dead). *Lynfergusonia taroomiana* x 2 (dead). Undescribed sp. x 1 (dead)	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Robinson Creek on Robinson Creek Rd	DF20	S:25°29'22.9" E:149°33'09.8"	1	degraded creek with levee banks and sandy bed	*E. tereticornis, M. viminalis, C. cunninghamiana*	grassy	total grass cover, some logs/other debris	*Figuladra mattea* x 5 (dead) and x 30 (live)	
State Forest (Currajong Rd)	DF21	S:25°22'38.1" E:149°21'40.6"	1	waterway with fringing *E. tereticornis* on sand. Dry	*E. tereticornis, Corymbia sp.,* Callitris sp. up slope	tussock grass	poor, small logs/branches. Minimal leaf litter	*Figuladra mattea* x 1 (dead - juvenile). *Scagacola brigalow* x 1 (dead)	
State Forest (Currajong Rd)	DF22	S:25°24'06.8" E:149°21'03.3"	1	waterway with fringing vegetation	*Eucalypt*us *sp.*, *Angophora leiocarpa, Callitris* sp.	sparse grass cover	large logs and leaf piles - dry substrate	*Lynfergusonia taroomiana* x 1 (dead - juvenile)	
State Forest (Currajong Rd - Gunnadoo)	DF23	S:25°26'11" E:149°20'11.5"	1	degraded waterway	*E. tereticornis, C. tessellaris, M. viminalis, Livistona sp.* (sparse)	grass	moderate, logs, branches, rocks in creek bed. Bed sandy and rocky	Helicarionidae x 6 (live) and x 6 (dead)	
Glenhoughton Rd (Stanisic site)	DF24	S:25°29'07.5" E:149°42'13.9"	1	flat alluvial bed adjacent to Robinson Creek	*E. tereticornis, Livistona sp.*	grass, bare soil	palm fronds, logs branches	Undescribed sp. x 1 (live - adult)	
Palm Tree Creek - (Leichhardt Highway)	DF25	S:25°29'53.6" E:149°46'39"	1	Relatively well vegetated creek system with eucalypts and *Livistona nitida*. Bank approximately 5m from bed.	*E. tereticornis,* Ironbark, *Livistona sp.*	grass and palm fronds	palm fronds, logs and branches	*Figuladra mattea* x 3 (dead).	
Ningi Karbi (Dawson River - Theodore)	DF26	S:25°59'32.1" E:150°04'28.8"	1	terraced banks along the Dawson River (east bank)	*E. tereticornis, E. camaldulensis, C. cunninghamiana, M. bracteata, Lysiphyllum Sp., Grevillea sp.*	tussock grass, leaf litter, juvenile *Livistona nitida*	good fallen timber, leaf piles	Undescribed sp. x 7 (dead)	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Ningi Karbi (Dawson River)	DF27	S:24°59'32.4" E:150°04'28.6"	1	terraced river bank with *E. tereticornis* and figs	*E. tereticornis, M. bracteata, F. coronata, Livistona sp.*	tussock grass	good. Fallen logs, branches, leaf litter surrounding base of figs and gums	*Scagacola brigalow* x 9 (dead). *Figuladra mattea* x 8 (dead) and x 1 (live - adult)	gently sloping banks with good microhabitat. Degraded from cattle and pig disturbance.
Ningi Karbi (Dawson River)	DF28	S:25°00'15.3" E:150°04'42.2"	1	terraced banks along river	*E. tereticornis, C. tessellaris* (upslope), *F. coronata, Livistona sp., M. bracteata*	leaf litter, bare soil	good leaf litter depth, logs, branches, high soil moisture evident	*Figuladra mattea* x 10 (dead)	
Ningi Karbi (Dawson River)	DF29/ 29	S:24°59'56.6" E:150°04'35.8"	1	*Acacia harpophylla* patch on waterway draining into river	*Corymbia sp., E. camaldulensis, A. harpophylla*	grass and small shrubs	good abundance of fallen logs	*Figuladra mattea* x 15 (dead)	
Dandarbong (Dawson River)	DF30	S:25°00'33.6" E:150°05'34.7"	1	sloping banks of river. No discernable levees	*E. tereticornis, E. camaldulensis, Livistona sp., F. coronata*	grassy	good, logs, branches, leaf litter	Undescribed sp. x 8 (dead). *Figuladra mattea* x 5 (dead)	
Good Lands (Dawson River)	DF31	S:25°01'01.1" E:150°06'40.5"	1	high terraced bank with overflow gully	*E. tereticornis* (sparse), *Livistona sp., F. opposita*	grass	good logs, branches, leaf litter	Undescribed sp. x 1 (dead)	overflow bank trapping moisture in soil
Taroom Town Common (Dawson River)	DF32	S:25°38'14.2" E:149°47'20.1"	1	relatively intact waterway with good riparian vegetation	*E. tereticornis, E. camaldulensis, M. linariifolia, Grevillea sp., Acacia sp.*	grass tussocks, leaf litter	fallen logs, branches, leaf piles		very dry cracking clay soils. No depth of mulch
Chain of Lagoons	DF33	S:25°31'04.7" E:149°46'45.9"	1	Eucalypt woodland with lagoons	*E. tereticornis, E. camaldulensis,* Scattered *Livistona sp.* (mainly along creek)	grass	good abundance of fallen logs, branches. Minimal leaf litter	*Figuladra mattea* x 2 (live) x10 (dead)	generally dry

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
Kia Ora (Leichardt Highway - Dawson River)	DF34	S:25°02'19.6" E:150°07'10.8"	1	alluvial terraces on Dawson River	*E. tereticornis, M. linariifolia, Acacia sp. Livistona sp* (sparse)	grass	logs, branches, minimal leaf litter	none	
Kia Ora (Leichardt Highway)	DF35	S:25°01'32.7" E:150°07'14.3"	1	terraced bank of Dawson River	*E. tereticornis, E. camaldulensis, Livistona sp* (sparse), *F. coronata* (sparse), *Acacia sp.*	grazed grass tussocks	good. Logs, branches, leaf litter (minimal) under figs	*Figuladra mattea* x 3 (live), *Adclarkia dawsonensis* x 2 (dead)	found under logs and leaf litter under figs.
Kia Ora (Leichardt Highway)	DF36	S:25°01'16.5" E:150°07'01.7"	2	creek off main river channel, small palm forest on lower bank	*E. tereticornis, Livistona sp., F. coronata,* Gahnia sp. at creeks edge	palm fronds	palm frond litter at base of palm	*Adclarkia dawsonensis* x 2 (dead), x 1 (live juvenile) and x 1 (live adult). *Figuladra mattea* >20 (live) and >20 (dead)	
Kia Ora (Dawson River)	DF37	S:25°01'17.4" E:150°06'47.5"	1	palm tree grove within depression off main river channel	*E. tereticornis, Livistona sp, F. coronata,*	fronds, bare soil	good depth of litter, but few logs	*Adclarkia dawsonensis* x 1 (live) adult. *Figuladra mattea* x 5 (live - adult)	soil moisture good in sheltered depression
Kia Ora (Drainage Line)	DF38	S:25°02'58.1" E:150°05'18.6"	1	Remnant Brigalow degraded on alluvium	*E. tereticornis, C. tessellaris, Geijera Sp., A. harpophylla, Lysiphyllum sp.*	grasses	logs and log piles, minimal leaf litter	*Figuladra mattea* x 5 (live - adult) and x 10 (dead)	
Baroondah crossing of Dawson River	JR1		1		*Casuarina cunninghamiana, Eucalyptus camaldulensis, Lomandra longifolia, Melaleuca viminalis, Ficus opposita, Austrodanthonia sp. Oplismenus imbecillis*	*Melaleuca viminalis* mid-storey, Persicaria spp.	Deep leaf litter from Ficus / Eucalyptus. Mats of native grasses and moist habitat areas	Undescribed sp. 1	

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
	JR2		1	Dawson River riparian zone with adjacent small boggomoss	*Eucalyptus camaldulensis*, Corymbia sp.	*Lomandra longifolia* and various grasses	Abundance of woody debris, but substrate dry	none	
	JR3		1	*Eucalyptus populnea* and *Acacia harpophylla*	*Eucalyptus populnea, Eucalyptus camaldulensis, Acacia harpophylla*		Abundance of woody debris. Moist soils surrounding standing water	none	
	JR4		1	Fringing forest of *Casuarina cunninghamiana* with *Eucalyptus tereticornis* on oxbow	*Eucalyptus tereticornis, Casuarina cunninghamiana, Melaleuca viminalis*	Variety of native grasses	Sparse woody debris, dry substrate and dry leaf litter	none	
Yebna	JR5		1		*Eucalyptus camaldulensis, Casuarina cunninghamiana, Melaleuca viminalis, Ficus opposita*	*Lomandra longifolia. Oplismenus imbecillis, Austrostipa sp.*	Fallen logs, abundance of leaf litter and bark.	Undescribed sp. 1 x2 adults, x1 sub-adult	Snails found under southern side of trees under bark and leaf litter and under Ficus.
Yebna	JR6		1	Riparian woodland on Dawson River	Casuarina cunninghamiana, Eucalyptus tereticornis, Corymbia tessellaris, Callitris sp., Melaleuca viminalis, Ventilago viminalis, Alectryon pubescens, Trema aspera, Ficus opposita, Alphitonia sp.	Imperata cylindrica, Croton sp. Notolea sp. Excocaria sp.	Abundance of woody debris and deep leaf litter under large trees	Undescribed sp. 1 x2 adult	Snails found under log on edge of vine thicket and under deep leaf litter at base of trees

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
	JR7		1	Eucalyptus camadulensis riparian woodland on Dawson River	Eucalyptus camadulensis, Casuarina cunninghamiana, Melaleuca viminalis	Imperata cylindrica, Croton sp. Notolea sp. Excocaria sp.	Abundance of woody debris and deep leaf litter under large trees	none	
	JR8		1		Eucalyptus tereticornis, Casuarina cunninghamiana, Melaleuca viminalis	Austrotipa sp. Lomandra longifolia	some logs	none	
	JR9		1	Elrombah crossing of Dawson River	Eucalyptus tereticornis, Eucalyptus coolibah	Cenchrus cilliaris	Few logs and other woody debris	none	
	JR10		1	Chain of Lagoons, Palm Tree Creek	Eucalyptus coolibah, Eucalyptus tereticornis, Livistona nitida	Heteropogon sp.	Deep litter of palm fronds within groves	Brigalow x1 sub-adult shell	
	JR11		1	Juandah Creek crossing of Taroom-Roma Road	Eucalyptus tereticornis, Eucalyptus coolibah	Dichanthium sp., and bare ground	Abundance of woody debris and leaf litter		Weir upstream on Juandah Creek
	JR12		1	Conservation Park	Acacia harpophylla with vine thicket species	Cenchrus cilliaris	Abundance of small woody debris		
	JR13		1	Roadside Acacia harpophylla remnant on Tarooom-Roma Road	Acacia harpophylla, Bauhinia sp. Geijera parviflora	Cenchrus cilliaris	Abundance of small woody debris and leaf litter from Acacia harpophylla		

Site/Property Name	Team	Coordinates	Search Time	Site Description	Vegetation: Canopy/ Mid Stratum	Ground Stratum	Microhabitat Structure	Snails Found:	Sig. habitat characters
	JR14	S:25°07'39" E:150°08'33"	1	Riparian woodland on Dawson River	Eucalyptus tereticornis, Livistona nitida, Eucalyptus coolibah, Ficus opposita (abundant)	Native grasses and abundant palm fronds	Deep leaf litter and fallen Livistona logs	*Figuladra mattea* x2 live, x9 dead, Taroom forest snail x1 dead	
	JR15	S:25°08'20" E:150°08'40"	1	Tall woodland on Dawson River	Eucalyptus tereticornis, Melaleuca viminalis, Eucalyptus coolibah, Ficus opposita	Lomandra longifolia and native grasses	Abundance woody debris, sparse and variable depth of leaf litter		
	JR16	S:25°09'03" E:150°09'08"	1	Riparian woodland on Dawson River	Eucalyptus tereticornis, Livistona nitida, Ficus opposita	Bare or native grasses	Moderate number of logs and good depth of palm fronds becoming grassy on upper terraces	*Figuladra mattea* x2 live, Adclarkia dawsonensis x1 live	
	JR17	S:25°09'37" E:150°09'38"	1	Tall woodland on Dawson River	Livistona nitida dominant with Ficus opposita	Dense grasses	Palm logs and high grass cover	*Figuladra mattea* x14 live, x4 dead	
	JR18	S:25°10'31" E:150°10'42"	1	Livistona woodland on Dawson River	Livistona nitida dominant with Ficus opposita	Sparse cover	Dense coverage of palm fronds and Ficus smothered with grasses	Adclarkia dawsonensis x2 live adults, x1 live sub-adult, x5 dead, *Figuladra mattea* x5 live, x9 dead	
	JR19	S:25°05'38" E:150°09'07"	14	Eucalyptus tereticornis, Livistona nitida woodland on anabranch of Dawson River	Eucalyptus tereticornis, Livistona nitida, Melaleuca viminalis, Ficus opposita	Cenchrus cilliaris	Fallen palm logs and good depth of leaf litter	*Figuladra mattea* x6 live, x4 dead, Adclarkia dawsonensis x8 live, x13 dead (includes transect data)	

Appendix C Site Descriptions of Snail Locations

Site no.	DF36
Property name / locality	"Kia Ora", Theodore
Coordinates	25°01'16.5" S, 150°07'01.7" E.
Search time (person hours)	2
Site description	Lower bank of small overflow from Dawson River Anabranch.
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Eucalyptus tereticornis* open forest *Livistona nitida* (moderate), *F. opposita* (sparse to moderate), Lomandra sp. at bank edge. Good depth of palm fronds within small palm groves
Snails Found	*Figuladra mattea* x >20 live, x >20 dead *Adclarkia dawsonensis* x 2 live (adult and sub-adult), x 2 dead
Transect	No transect

Site no.	DF37
Property name / locality	“Kia Ora”, Theodore
Coordinates	25°01’17.4” S, 150°06’47.5” E.
Search time (person hours)	1
Site description	Depression between first and second levee banks on Dawson River Anabranch.
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Eucalyptus tereticornis* woodland *Livistona nitida* (moderate), *F. opposita* (sparse) Good depth of palm fronds within small palm groves, although lack of woody debris such as logs and branches.
Snails Found	*Figuladra mattea* x 5 live *Adclarkia dawsonensis* x 1 live (adult)
Transect	No transect

Site no.	VH24 / D14
Property name / locality	"Southend"
Coordinates	25°07'33.5" S, 150°06'15.6" E.
Search time (person hours)	3
Site description	Ephemeral billabongs with narrow fringe of *Eucalyptus tereticornis* and *Livistona nitida*
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Eucalyptus tereticornis, E. coolibah* (upslope) open forest *Livistona nitida, F. opposita* (sparse) Deep leaf litter around palm groves and variety of woody debris surrounding billabong. Fenced off from cattle.
Snails found (does not include transect results)	*VH24* *Figuladra mattea* x 3 dead *Adclarkia dawsonensis* x 2 live (adult), x 5 dead
Transect	*D14* Informal transect completed across shaded margin of billabong. Plots skewed to good microhabitat due to patchiness of overall habitat. In 20 1m x 1m plots (ie. 20m^2), 6 x live *Adclarkia dawsonensis* (2 adults, 4 sub-adults), x 12 dead *Adclarkia dawsonensis*

Site no.	VH25
Property name / locality	"Southend"
Coordinates	25°07'09.5" S, 150°08'39.2" E.
Search time (person hours)	1
Site description	Livistona closed forest on Dawson River
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Eucalyptus tereticornis, E. camadulensis* *Livistona nitida* (dense), *F. opposita* Some *Megathyrsus maximus* infestations, predominantly outside dense palm groves Good depth of litter within palm groves and under *F. opposita*, some woody debris
Snails found (does not include transect results)	*Adclarkia dawsonensis x 1* dead
Transect	*Figuladra mattea* x 4 live, x 8 dead *Adclarkia dawsonensis* x 2 live (adult), x 1 dead

Site no.	JR16
Property name / locality	"Lagoona"
Coordinates	25°09'03" S, 150°09'08" E.
Search time (person hours)	1
Site description	First levee bank on western side of Dawson River
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Eucalyptus tereticornis* woodland *Livistona nitida, F. opposita* (sparse) Debris or grass infestations, particularly on higher levee banks Moderate coverage of woody debris, very deep palm frond litter.
Snails found	*Figuladra mattea* x 3 live *Adclarkia dawsonensis* x 1 live (adult)
Transect	No transect

Site no.	JR18
Property name / locality	“Lagoona”
Coordinates	25°10’31” S, 150°10’42”
Search time (person hours)	1
Site description	First levee bank on western side of Dawson River
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Livistona nitida* closed forest, *F. opposita* (moderate) Good depth of palm frond and leaf litter, no grass infestation. Ground layer noticeably moist.
Snails found	Adclarkia dawsonensis x2 live adults, x1 live sub-adult, x5 dead, *Figuladra mattea* x5 live, x9 dead
Transect	No transect

Site no.	JR19
Property name / locality	“Lagoona” / Isla-Delusion Camping Reserve
Coordinates	S:25°05'38" E:150°09'07"
Search time (person hours)	1
Site description	First levee bank on western side of Dawson River
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Livistona nitida* closed forest, *F. opposita* (moderate) Very sparse Good depth of palm frond and leaf litter, although some areas infested by grasses.
Snails found	Site was set up as transect, so no initial search results
Transect	Transect (Isla-Delusion Crossing) In 20m^2, x 1 live adult, x 1 dead adult Transect (“Lagoona”) In 80m^2, x 7 live adults, x 12 dead adults

Site no.	D11
Property name / locality	Nathan Gorge, Cabbage Tree Creek
Coordinates	25°10'31" S, 150°10'42" E.
Search time (person hours)	1.5
Site description	Depauperate rainforest on lower levee banks at confluence of creek with Dawson River
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Eucalyptus tereticornis* woodland *Livistona nitida* (moderate – sparse), *F. opposita* (sparse), *Lophostemon suaveolens, Mallotus claoxyloides* Good depth of palm frond litter and moist humus layer
Snails found	*Xanthomelon distratum* x 2 dead Camaenidae sp. A x 3 live, x 5 dead *Adclarkia dawsonensis* x 4 live (3 adults, 1 sub-adult), x 2 dead
Transect	No transect

Site no.	D15
Property name / locality	"Southend"
Coordinates	25°07'01.9" S, 150°08'27.6" E.
Search time (person hours)	1
Site description	Highest levee bank on western side of Dawson River Anabranch
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Eucalyptus tereticornis* open forest *Livistona nitida* (dense), *F. opposita* (sparse) Dense infestations of grasses outside groves. Good depth of palm frond and leaf litter within groves. Very dry in patches, but moist humus layer at site where *Adclarkia dawsonensis* found.
Snails found	*Figuladra mattea* x 6 live, x 5 dead *Adclarkia dawsonensis* x 1 live (adult)
Transect	No transect

Site no.	D16
Property name / locality	"Southend"
Coordinates	25°06'42.5" S, 150°08'18.9" E.
Search time (person hours)	1
Site description	Depression formed on first levee bank on western side of Dawson River Anabranch.
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Eucalyptus tereticornis* open forest *Livistona nitida* (dense – near closed forest), *F. opposita* (sparse), *Lophostemon suaveolens* (sparse) Dense infestations of grasses outside palm groves. Good depth of palm frond and leaf litter within groves and deep piles of litter from flood action (photo shows excavation of flood debris where live adult *Adclarkia dawsonensis* found).
Snails found	*Figuladra mattea* x 5 live, x 5 dead *Adclarkia dawsonensis* x 1 live (adult), x 3 dead
Transect	No transect

Site no.	D4
Property name / locality	"Gyranda Weir"
Coordinates	25°18'58" S, 150°10'14.6" E.
Search time (person hours)	1
Site description	First levee bank on western side of Dawson River
Vegetation **Canopy / midstorey** **Ground layer** **Microhabitat structure**	 *Eucalyptus tereticornis* and *Corymbia tessellaris* open forest *Livistona nitida* (dense), *F. opposita* (sparse), Dense infestations of grasses on upslope areas. Good depth of palm frond and leaf litter within groves and deep piles of litter from flood action. Moderate abundance of woody debris including large logs and branches.
Snails found	
Transect	*Figuladra mattea* x 5 live, x 5 dead *Adclarkia dawsonensis* x 1 live (adult), x 3 dead