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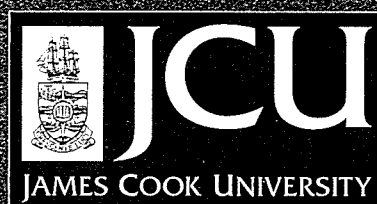
*Australian Centre for Tropical Freshwater Research*

**FLORISTICS, STRUCTURE AND  
REGENERATION OF RIPARIAN  
VEGETATION IN THE GREGORY  
RIVER CATCHMENT**

**DRY SEASON SURVEY, 10-16 AUGUST 2004**

ACTFR Report No. 04/09

September 2004



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**Dry season survey, 10-16 August 2004**

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## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>1.0 INTRODUCTION.....</b>	<b>2</b>
<b>1.1 Riparian vegetation.....</b>	<b>2</b>
<b>2.0 METHODS .....</b>	<b>4</b>
<b>3.0 RESULTS .....</b>	<b>6</b>
<b>4.0 SUMMARY OF SURVEY SITES.....</b>	<b>12</b>
<b>4.1 Gregory River – The Knob .....</b>	<b>12</b>
<b>4.2 Gregory River – Six Mile .....</b>	<b>12</b>
<b>4.3 Gregory River – Gregory Downs camping area .....</b>	<b>13</b>
<b>4.4 Gregory River – Gregory Downs Station .....</b>	<b>14</b>
<b>4.5 Gregory River – west of Tirranna Roadhouse.....</b>	<b>15</b>
<b>4.6 Beames Brook – Brinawa Crossing.....</b>	<b>15</b>
<b>4.7 Beames Brook – downstream of Black Gully Junction .....</b>	<b>16</b>
<b>4.8 Beames Brook - Brookdale.....</b>	<b>17</b>
<b>4.9 Beames Brook – upstream of Albert River Junction.....</b>	<b>18</b>
<b>4.10 Lawn Hill Creek – Big Lagoon .....</b>	<b>19</b>
<b>4.11 Lawn Hill Creek – Lawn Hill Station .....</b>	<b>19</b>
<b>4.12 Lawn Hill Creek – Bluewater Waterhole Crossing .....</b>	<b>20</b>
<b>4.13 Running Creek .....</b>	<b>21</b>
<b>4.14 One Mile Creek .....</b>	<b>21</b>
<b>4.15 Elizabeth Creek.....</b>	<b>22</b>
<b>5.0 SUMMARY .....</b>	<b>24</b>
<b>6.0 REFERENCES.....</b>	<b>26</b>
<b>Appendix 1.....</b>	<b>28</b>

## LIST OF TABLES AND FIGURES

**Table 1.** Study site names and GPS readings of riparian vegetation survey sites.

**Table 2.** Channel widths and riparian zone widths at the Gregory River catchment sites.

**Table 3.** Dominant tree and shrub species in the riparian zone in the Gregory River catchment.

**Table 4.** Abundance of large *Melaleuca* spp in the Gregory River catchment.

**Table 5.** Population structure of large *Melaleuca* spp. in the Gregory River catchment.

**Table 6:** Presence and abundance of *Cryptostegia grandiflora* (rubber vine) in the Gregory River catchment.

**Table 7:** Non-deleterious weeds species in the riparian zone in the Gregory River catchment.

**Figure 1:** Study sites of riparian vegetation in the Gregory River catchment.

**Figure 2:** Six most dominant tree species in the Gregory River catchment.

**Figure 3:** Distribution of the six most dominant over story species in the Gregory River catchment.

**Figure 4:** Distribution of Rubber vine, *Cryptostegia grandiflora*, in the Gregory River catchment.

## EXECUTIVE SUMMARY

- The riparian vegetation at 15 sites in the Gregory River catchment was surveyed to determine floristic composition, and the structure and regeneration regime of the dominant tree species.
- The most dominant tree species was *Melaleuca leucadendra*, recorded in 14 sites, and accounted for 41.3% of the cover at all sites surveyed.
- Other dominant species included *Pandanus spiralis* (16.3% cover), *Nauclea orientalis* (7% cover), *Ficus racemosa* (7% cover), *Livistona rigida* (4.7% cover) and *Terminalia canescens* (2.4% cover).
- The only deleterious weed species recorded was *Cryptostegia grandiflora*, Rubber vine, and occurred at six sites, and with a cover ranging from 1-5%. Immediate action is required if spread of this weed to other parts of the Gregory River catchment is to be prevented.
- The over story trees in the riparian vegetation in the 15 sites surveyed displayed significant structural integrity, with numbers of individuals being greater than 15 in a 100 m transect in more than half the sites.
- Regeneration regimes indicated that significant regeneration was occurring at eleven sites, whilst no regeneration was observed at four sites.

## 1.0 INTRODUCTION

The Gregory River catchment is situated in the Gulf Plains bioregion, and has a tropical climate with a winter dry season and a monsoonal wet season (Sattler & Williams 1999). The Gregory River is the largest perennial stream in the arid to semi-arid regions of Queensland (Morton *et al.* 1996), and the catchment covers an area of approximately 60 000 km<sup>2</sup>.

### 1.1 Riparian vegetation

Riparian zones are well recognized as keystone areas of biological, physical and chemical interaction between terrestrial and aquatic ecosystems, and have a high biodiversity in relation to surrounding landscapes. The linear riparian vegetation systems associated with major creeks and rivers of the Gregory catchment provide important habitats and movement corridors for many plant and animal species in what is essentially an arid and sparsely vegetated country (Dames & Moore 1994; Environment North 1999). Many species are restricted to riparian areas, including birds such as the Purple Crowned Fairy Wren and Crimson Finch. Seasonal migrants such as the Dollarbird, Torresian Imperial Pigeon and Common Koel may also depend upon these riparian systems as a dispersal conduit into the interior (Dames & Moore, 1994). The riparian fringes and permanent waters represent a refuge for terrestrial fauna during both the dry season, and also during flood events when they may be the highest feature not inundated on a floodplain.

The riparian zone is important to the functioning and integrity of instream aquatic environments. Mediation occurs through the function of terrestrial inputs, light and thermal regulation, nutrient interception and release, maintenance of bank stability and provision of a variety of habitat types and refugium (Naiman & Decamps 1997). As a simple example of the value of riparian zones to aquatic ecosystems, the direct consumption of terrestrial materials by aquatic organisms has been documented for many of the species inhabiting the Gregory catchment. The consumption of fruit by Australian freshwater fish is also apparently common (Pusey *et al.* 1995). Sooty grunter (*Hephaestus fuliginosus*) are known for their propensity for congregating and feeding below fruiting cluster figs (*Ficus racemosa*) and Leichhardt trees (*Nauclea orientalis*).

Food of terrestrial origin such as leaves and fruit has also been documented as a significant dietary component for many of northern Australia's freshwater turtle species (Kennett & Tory 1996; White 1999). The flowers, fruit leaves and bark of streamside plants such as *Melaleuca* spp. (Paperbark), *Pandanus* spp. and *Ficus* spp. (Figs) all may be dietary resources of turtle species throughout the Gregory catchment (White 1999). Figs may be such an important

dietary component for the highly frugivorous Gulf Snapping Turtle (*Elseya lavarackorum*), that the presence of riparian fig trees has in fact been suggested as a potential limiting factor in the distribution of this species in the Gregory catchment (White 1999). While not proven, associated dispersal of riparian seeds by frugivorous aquatic species has been suggested as a related ecosystem function, and may be a plausible mechanism for upstream dispersal of riparian plants (Kennett & Tory 1996). The linkages between the riparian and instream habitats provide maintenance of fundamental and long-term function and composition of these ecosystems.

The vegetation within the Gregory River catchment is predominantly eucalypt woodland and open forests, with areas of grasslands, gidgee scrubs, and freshwater and estuarine wetlands (Blackman *et al.* 1996). Vegetation surveys have been provided for the Lawn Hill Creek area within the Lawn Hill National Park (Bean 1992), and for pasture lands (Tothill and Gillies 1992). Plant identification books for north-west Queensland that are relevant to the Gregory River catchment are available (Milson 2000a, 2000b). The condition of the vegetation of the catchment, for the most part, was summarised as 'unchanged since settlement' except for the replacement of Tussock Grassland by Open Tussock Grassland of *Astrebla* [Mitchell Grass] (Department of Primary Industries 1993). A brief account of riverine vegetation was provided on the Australian Heritage Database (2004), which also listed at least two species for the bioregion that are rare in Queensland, *Cycas brunnea* (Cycadaceae) and *Brachychiton collinus* (Sterculiaceae), but neither of these species are associated with the riparian zone.

The aim of this survey was to provide baseline data on the floristic composition, structure, and reproductive regime of the riparian vegetation for selected water courses within the Gregory River catchment, downstream from Adels Grove on Lawn Hill Creek, downstream of The Knob on Gregory River, and to as far downstream on tributaries to the confluence of Albert River and Beames Brook. As the survey was conducted during August, the results reflect the dry season condition of the riparian zone.

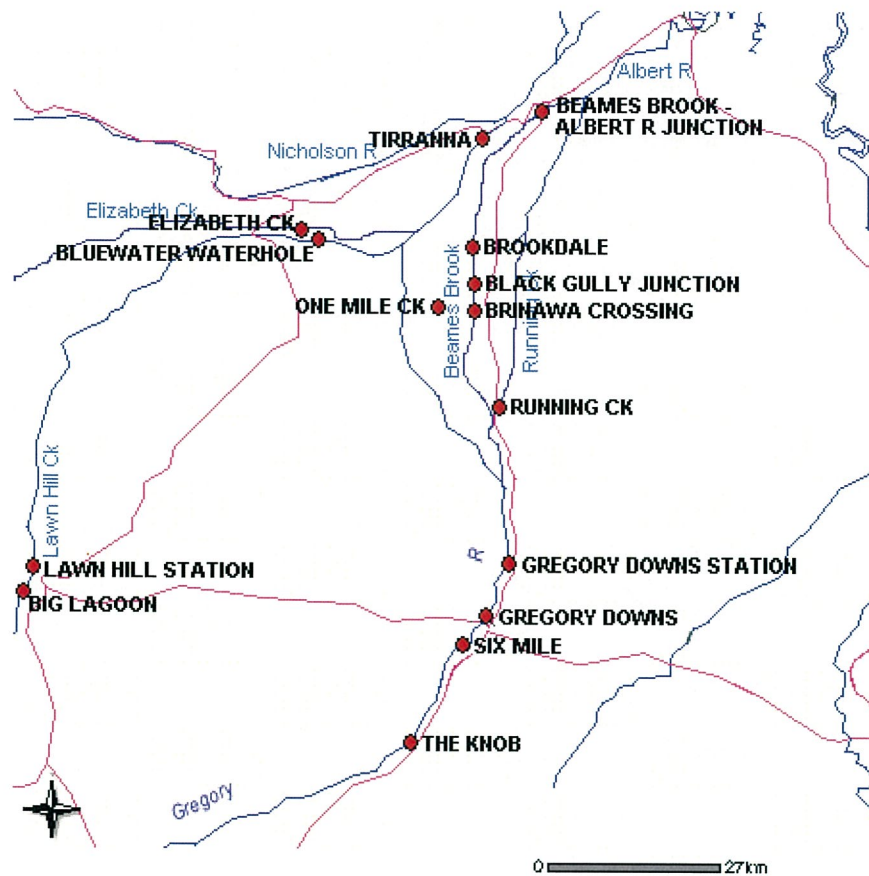
## 2.0 METHODS

The sites surveyed and GPS readings are listed in Table 1 and indicated on Figure 1. Surveys were conducted between 10-16 August 2004, which is the dry season in that area. Data collection utilised the Tropical Rapid Assessment of Riparian Condition (TRARC) pro formae. The TRARC method records data on stream morphology; status of fencing; cattle and/or feral animal activities; the dominant trees and deleterious weeds and their population structures; the presence of additional weeds; dominant grasses; species within the understorey; percentage covers of standing dead vegetation, canopy, understorey, debris, and bare ground. Surveys were based on a 100 m x 5-20 m transect at each site, placed parallel to the stream edge, with the ultimate width of the transect being dependent on the width of the riparian zone [not less than 5 m, and not greater than 20 m]. GPS readings were taken at the centre [50 m point] of the transect. The TRARC method allows the ecological characteristics of a site to be scored and comparative scores between sites to be determined. The higher the score the greater the ecological health of a site. Although the TRARC method was used in data collection, scores are provided only as a guide, on the rational that these surveys are intended to provide base data and not an appraisal of the 'ecological health' of the sites *per se*: the TRARC scores are therefore listed but will not be discussed further in this report. However, data from the TRARC method can also be used to analyse species distribution, abundances and population structure, which was the object of this study.

**Table 1.** Study site names and GPS readings of riparian vegetation survey sites in the Gregory River catchment, conducted 10-16 August 2004.

watercourse	location	GPS
Gregory River	The Knob	S18° 54' 22.1", E138° 58' 58.5"
	Six Mile	S18° 43' 19.6", E139° 11' 19.8"
	Gregory Downs	S18° 38' 39.3", E139° 15' 07.7"
	Gregory Downs (Planet Downs)	S18° 29' 52.6", E139° 17' 17.1"
	Tirranna	S17° 53' 39.0", E139° 17' 07.5"
Beames Brook	Brinawa crossing	S18° 09' 56.6", E139° 14' 22.0"
	downstream of Black Gully jnt	S18° 09' 08.3", E139° 14' 56.2"
	Brookdale	S18° 03' 50.2", E139° 15' 47.4"
Lawn Hill Creek	upstream of Albert River jnt	S17° 52' 47.8", E139° 20' 28.4"
	Big Lagoon	S18° 41' 01.5", E138° 32' 19.5"
	Lawn Hill Station	S18° 34' 24.5", E138° 34' 58.7"
Running Creek	Bluewater Waterhole crossing	S18° 04' 18.1", E138° 54' 13.4"
	road to Almora	S18° 19' 27.6", E139° 15' 51.5"
One Mile Creek	Brinawa/Punjaub road	S18° 09' 42.1", E139° 13' 35.8"
Elizabeth Creek	Punjaub road crossing	S18° 03' 55.5", E138° 54' 22.8"





**Figure 1:** Study sites of riparian vegetation surveys in the Gregory River catchment, conducted 10-16 August 2004.

### 3.0 RESULTS

Altitude readings, and channel and riparian zone widths are presented in Table 2. Sixteen species of trees and shrubs were recorded as being a part of the dominant component of vegetation in the riparian zone (Table 3). The six most common tree species, each present at 40% or more of sites were, in order of decreasing occurrence, *Melaleuca leucadendra*, *Nauclea orientalis*, *Pandanus spiralis*, *Ficus racemosa*, *Livistona rigida* and *Terminalia canescens* (Figure 2). Distribution maps of these species are presented in Figure 3. A further four species were present in 13-27% of sites whilst seven species were present in only one site each. A summary of the abundance, percentage cover, size and degree of regeneration of *Melaleuca leucadendra*, the most dominant tree species, is provided in Table 4, and a summary of population structure is presented in Table 5.

**Table 2.** Study site names, altitude readings\*, channel widths and riparian zone widths at the Gregory River catchment sites, 10-16 Aug. 2004.

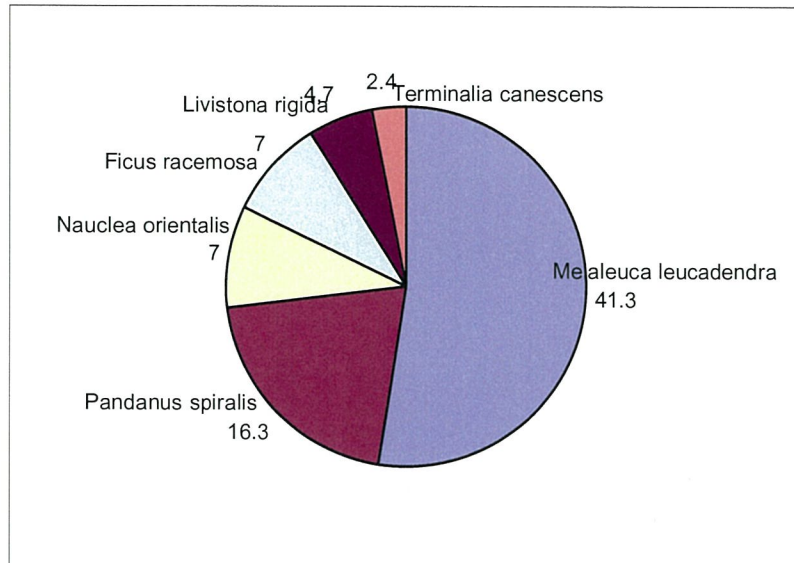
\*altitude readings taken with GPS may have  $\pm 50$  m variation from true height above sea-level, and must be used with caution.

<sup>1</sup> median ratio of channel width: riparian zone width is 0.7 for the 15 sites.

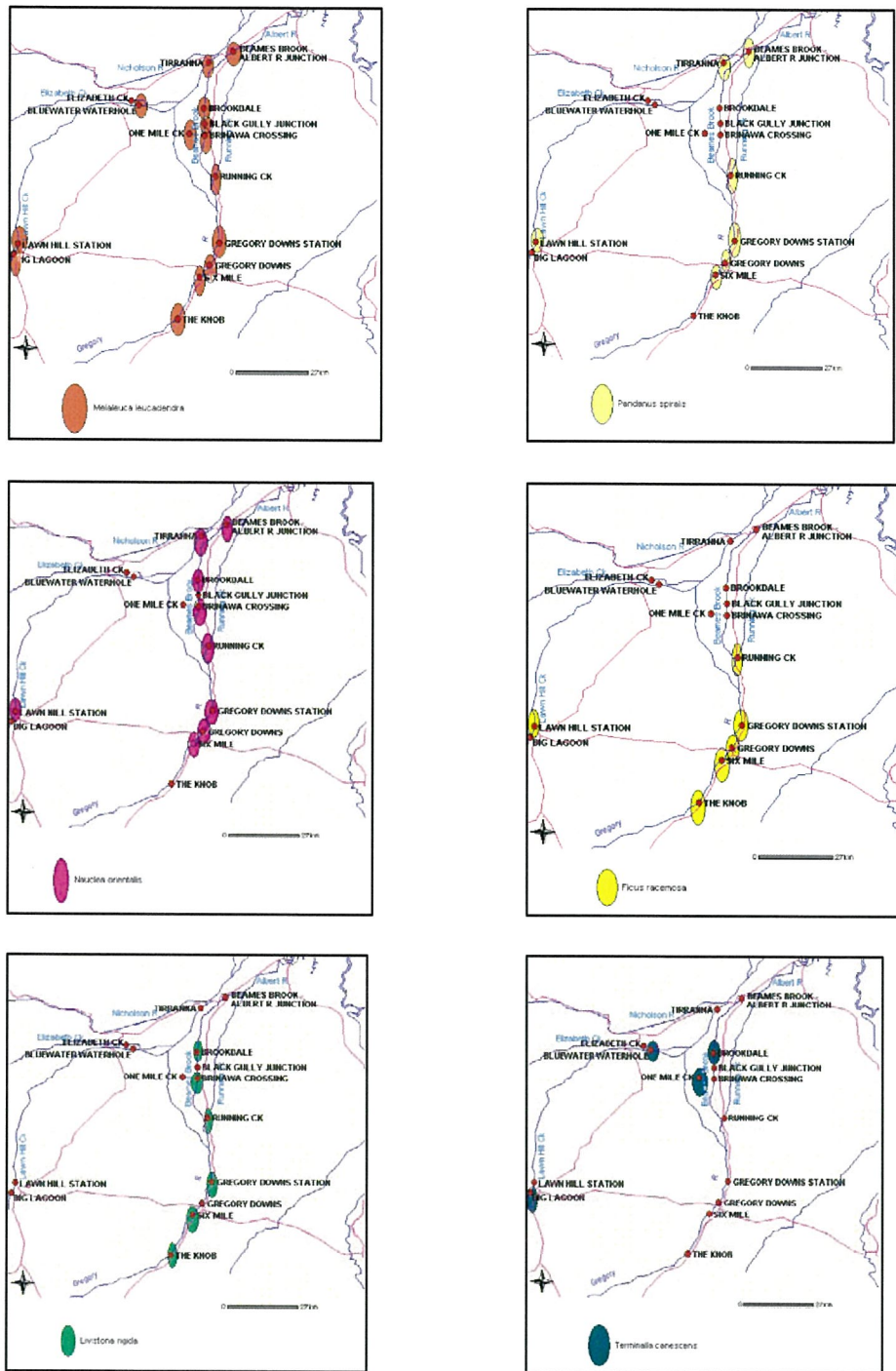
watercourse	location	altitude	channel width <sup>1</sup>	riparian width <sup>1</sup>
Gregory River	The Knob	97 m	10 m	15 m
	Six Mile	68 m	15 m	20 m
	Gregory Downs	72 m	8 m	20 m
	Gregory Downs Station	54 m	10 m	15 m
Beames Brook	Tirranna	17 m	3 m	8 m
	Brinawa crossing	48 m	3 m	10 m
	downstream of Black Gully jnt	46 m	3 m	8 m
	Brookdale	32 m	7 m	7 m
Lawn Hill Creek	upstream of Albert River jnt	14 m	4 m	8 m
	Big Lagoon	119 m	12 m	7 m
	Lawn Hill Station	75 m	15 m	10 m
Running Creek	Bluewater Waterhole crossing	9 m	4 m	7 m
	road to Almora	54 m	4 m	7 m
One Mile Creek	Brinawa/Punjaub road	52 m	5 m	8 m
Elizabeth Creek	Punjaub road crossing	46 m	5 m	7 m

**Table 3:** Dominant tree and shrub species in the riparian zone of 15 study sites in the Gregory River catchment, recorded in 100 m x 5-20 m transects, parallel to stream edge, 10-16 August 2004.

Species	# sites [n=15] where species was present	%cover at all sites	status
<i>Melaleuca leucadendra</i>	14	41.3	dominant
<i>Nauclea orientalis</i>	9	7	rare-occasional
<i>Pandanus spiralis</i>	7	16.3	frequent-dominant
<i>Ficus racemosa</i>	6	7	rare-occasional
<i>Livistona rigida</i>	6	4.7	rare-frequent
<i>Terminalia canescens</i>	4	2.4	rare-occasional
<i>Excoecaria parvifolia</i>	4	<2	frequent-dominant
<i>Casuarina cunninghamiana</i>	2	<2	rare-frequent
<i>Vitex acuminata</i>	2	<2	dominant
<i>Melaleuca bracteata</i>	1	<2	rare
<i>Lysiphillum cunninghamii</i>	1	<2	occasional
<i>Corymbia bella</i>	1	<2	occasional
<i>Corymbia</i> sp.	1	<2	occasional
<i>Acacia torulosa</i>	1	<2	frequent
<i>Lophostemon grandiflorus</i>	1	<2	dominant
<i>Melaleuca argentea</i>	1	3.3	dominant



**Figure 2:** The six most dominant tree species and their total percent cover in the riparian zone of 15 study sites in the Gregory River catchment, recorded in 100 m x 5-20 m transects, parallel to stream edge, 10-16 August 2004.



**Figure 3.** Distribution maps of the six most dominant tree species in the Gregory River catchment riparian study. Top left: *Melaleuca leucadendra*. Top right: *Pandanus spiralis*. Centre left: *Nauclea orientalis*. Centre right: *Ficus racemosa*. Bottom left: *Livistona rigida*. Bottom right: *Terminalia canescens*.

**Table 4.** Abundance of large *Melaleuca* spp. in 15 study sites in the riparian zone of Gregory River catchment, presented in decreasing number of mature individuals, recorded in 100 m x 5-20 m transects, parallel to stream edge, 10-16 August 2004. Degree of regeneration was estimated by the presence of class sizes in addition to mature individuals: 0 class sizes = absent; 1 class size = occasional; 2 class sizes = frequent; 3 class sizes = abundant.

\* = *Melaleuca argentea*; all others *Melaleuca leucadendra*.

study site	#individuals	%cover	size range	degree of regeneration
Beames Brook, upstream of Albert R jnt	42	70	8-10 m	absent
Gregory R, The Knob	34	60	14-16 m	occasional
Gregory R, Six Mile	30	70		frequent
Lawn Hill Ck, Lawn Hill Stn	22	55	14-15 m	frequent
Gregory R, Gregory Downs	18	40	9-12 m	frequent
Beames Brook, downstream of Black Gully jnt	18	60	7-10 m	occasional
Gregory R, Planet Downs	15	40	10-14 m	occasional
Running Ck	12	40	10-11 m	absent
Beames Brook, Brinawa crossing	12	40	8-10 m	occasional
Beames Brook, Brookdale	12	30	10-11 m	absent
*Elizabeth Ck	11	50	4-7 m	frequent
Gregory R, Tirranna	11	20	10-12 m	occasional
One Mile Ck	8	30	5-7 m	absent
Lawn Hill Ck, Big Lagoon	8	20	10-11 m	occasional
Bluewater Waterhole crossing	5	25	7-8 m	occasional

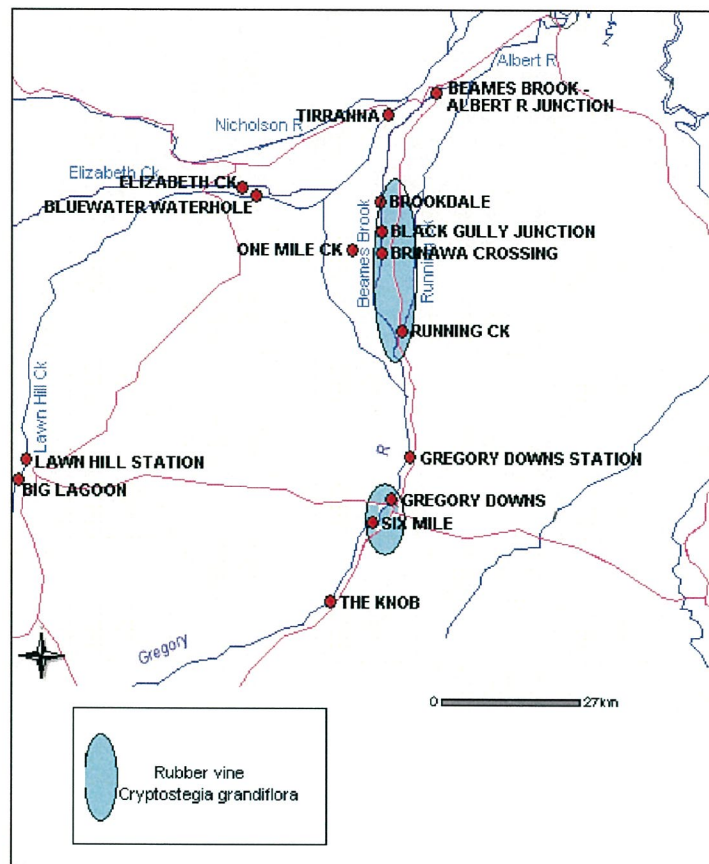
**Table 5:** Population structure of large *Melaleuca* spp. [*M. leucadendra* and \**M. argentea*] in the Gregory River catchment, in the riparian zone of 15 study sites in the Gregory River catchment, recorded in 100 m x 5-20 m transects, parallel to stream edge, 10-16 August 2004, arranged in descending order of degree of regeneration based on the total number of individuals in class sizes.

location	# mature	# subadults	# saplings	# seedlings
*Elizabeth Ck	11	18	30	0
Gregory R, Six Mile	30	14	6	0
Lawn Hill Ck, Lawn Hill Stn	22	4	18	0
Gregory R, Gregory Downs	18	2	4	0
Gregory R, The Knob	34	20	0	0
Beames Brook, downstream of Black Gully jnt	18	1	0	0
Gregory R, Planet Downs	15	4	0	0
Beames Brook, Brinawa crossing	12	0	2	0
Gregory R, Tirranna	11	1	0	0
Lawn Hill Ck, Big Lagoon	8	0	35	0
Bluewater Waterhole crossing	5	0	100	0
Beames Brook, upstream Albert R jnt	42	0	0	0
Beames Brook, Brookdale	12	0	0	0
Running Ck	12	0	0	0
One Mile Ck	8	0	0	0

Of the primary deleterious weeds associated with the riparian zones in rivers within the wet/dry tropics of northern Queensland, only *Cryptostegia grandiflora* (rubber vine) was present, and only at six sites - three on Beames Brook and in close proximity to each other; two sites on the Gregory River; and the Running Creek site. A summary of the presence, the abundance, and number of host trees is presented in Table 6, and a distribution map is presented in Figure 4.

**Table 6:** Presence and abundance of *Cryptostegia grandiflora* (rubber vine) in the Gregory River catchment riparian vegetation study sites, presented in decreasing number of mature individuals recorded in the riparian zone of 15 study sites in the Gregory River catchment, recorded in 100 m x 5-20 m transects, parallel to stream edge, 10-16 August 2004.

study site	# mature individuals	% cover	# host trees
Beames Brook, Brinawa crossing	40	5	10
Gregory R, Six Mile	14	5	6
Beames Brook, Brookdale	4	5	4
Running Ck	4	1	0
Beames Brook, downstream of Black Gully jnt	1	1	0
Gregory R, Gregory Downs	1	1	0



**Figure 4:** Distribution map of *Cryptostegia grandiflora*, Rubber vine, in the Gregory River catchment, recorded 10-16 August 2004.

A list of non-deleterious weeds is presented in Table 7, and a list of all species recorded in the riparian zone is presented in Appendix 1.

**Table 7:** Non-deleterious weed species in the riparian zone of 15 study sites in the Gregory River catchment, recorded in 100 m x 5-20 m transects, parallel to stream edge, 10-16 August 2004.

species	sites present
<i>Achyranthes aspera</i>	Gregory R, camping site at Gregory Downs (n=1)
<i>Calytropis procera</i>	Gregory R, Six Mile; Gregory R, Gregory Downs Station (n=2)
<i>Cardiospermum halicacabum</i>	Gregory R, Gregory Downs Station (n=1)
<i>Xanthium occidentale</i>	Gregory R, The Knob; Gregory R, Six Mile; Gregory R, camping site at Gregory Downs; Gregory R, Gregory Downs Station; Gregory R near Tirranna Roadhouse; Beames Brook, Brookdale; Beames Brook, upstream of Albert R junction; Lawn Hill Ck, Lawn Hill Station; Running Ck, Almora Station; One Mile Ck, Punjaub; Elizabeth Ck, Lawn Hill Station (n=11)

## 4.0 SUMMARY OF SURVEY SITES

### 4.1 Gregory River - The Knob

*Access:* Situated about 3 km off the Camooweal-Burketown road, 38 km south of Gregory Downs, where a well-formed track lead to the river with the site at the end of the track, on the eastern side of the river. *GPS:* S18° 54' 22.1", E138° 58' 58.5"; *Altitude:* 97 m

*Geophysical setting:* Channel width was 10 m with a perennial flow, the riparian width 15 m, and with a 2 m vertical rise from the water to the transect position. Slumping occurred in 20% of the transect, and gullying in 5% with two 1 m wide gullies. The stream bed was rocky and the banks were sandy. There were no fences or waterpoints, and the site had cattle tracks both parallel and perpendicular to the stream edge.

*Transect:* Transect was 100 m long by 15 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with 34 mature individuals, 14-16 m tall, 20 subadults 6-10 m tall, and cover of 60%. Other significant species included *Ficus racemosa* with 10% cover, and *Acacia torulosa* and *Livistona rigida* each with 5% cover. Fine woody debris accounted for 10-29 % of cover and course woody debris for 1-20% of cover. There were no deleterious weed species. TRARC score was 70.6, a rating of good condition.

Species recorded:

<i>Acacia torulosa</i>	<i>Livistona rigida</i>
<i>Chrysopogon elongatus</i>	<i>Melaleuca leucadendra</i>
<i>Clerodendrum floribundum</i>	<i>Vitex acuminata</i>
<i>Erythrophleum chlorostachys</i>	<i>Xanthium occidentale</i>
<i>Ficus racemosa</i>	

### 4.2 Gregory River - Six Mile

*Access:* Situated about 8 km off the Camooweal-Burketown road 18 km south of Gregory Downs, where a well-formed track lead to the river where the site was at the end of the track, on the eastern side of the river. *GPS:* S18° 43' 19.6", E139° 11' 19.8"; *Altitude:* 68 m

*Geophysical setting:* Channel width was 20 m with a perennial flow, the riparian width 35 m, and with a 2 m vertical rise from the water to the transect position. Slumping or gullying did not occur in the transect. The stream bed was rocky and the banks sandy. There were no fences or waterpoints, and the site had no identifiable cattle tracks.

*Transect:* Transect was 100 m long by 20 m wide, placed contiguous and parallel to the stream edge.



*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with 30 mature individuals, 10-12 m tall, 14 subadults 2-3 m tall, 6 saplings 1-1.5 m tall, and cover of 70%. Other significant species included *Pandanus spiralis* with 50% cover along the stream edge, and *Ficus racemosa*, *Livistona rigida* and *Nauclea orientalis* each with 10% cover. Fine woody debris accounted for 30-49% of cover and coarse woody debris for 1-20% of cover. The only deleterious weed species was *Cryptostegia grandiflora* (rubber vine) with 14 mature individuals of which six were climbing host trees, with 5% cover. TRARC score was 60.6, a rating of average condition.

Species recorded:

<i>Acacia torulosa</i>	<i>Livistona rigida</i>
<i>Calytropis procera</i>	<i>Melaleuca leucadendra</i>
<i>Chrysopogon elongatus</i>	<i>Nauclea orientalis</i>
<i>Cryptostegia grandiflora</i>	<i>Pandanus spiralis</i>
<i>Ficus racemosa</i>	<i>Xanthium occidentale</i>
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	

#### 4.3 Gregory River - Gregory Downs public camping area

*Access:* Situated on the Gregory River downstream about 500 m from the Gregory Downs/Adels Grove road bridge crossing, where a well-formed track leads to the river downstream, and the site was near the end of the track, on the eastern side of the river. *GPS:* S18° 38' 39.3", E139° 15' 07.7"; *Altitude:* 72 m

*Geophysical setting:* Channel width was 20 m with a perennial flow, the riparian width 12 m, and with a 3 m vertical rise from the water to the transect position. Slumping or gullyng did not occur in the transect. The stream bed was rocky and the banks sandy. There were no fences or waterpoints, and the site had random cattle tracks, although camping sites and human debris were present.

*Transect:* Transect was 100 m long by 12 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with 18 mature individuals, 9-12 m tall, 2 subadults 7-9 m tall, 4 saplings 3-4 m tall, and cover of 40%. Other significant species included *Ficus racemosa* also with 40% cover, *Pandanus spiralis* with 80% cover along the stream edge, and *Nauclea orientalis* with 15% cover. Fine woody debris accounted for 10-29 % of cover and coarse woody debris for 1-20% of cover. The only deleterious weed species was *Cryptostegia grandiflora* (rubber

vine) with one mature individual, with 1% cover. TRARC score was 65.3, a rating of average condition.

Species recorded:

<i>Acacia torulosa</i>	<i>Melaleuca leucadendra</i>
<i>Achyranthes aspera</i>	<i>Nauclea orientalis</i>
<i>Calytropis procera</i>	<i>Pandanus spiralis</i>
<i>Cryptostegia grandiflora</i>	<i>Vitex acuminata</i>
<i>Ficus racemosa</i>	<i>Xanthium occidentale</i>

#### 4.4 Gregory River - Gregory Downs Station (Planet Downs)

*Access:* Situated about 1 km downstream from the Gregory Downs Station, where a well-formed track leads to the river where the site is at the end of the track, on the eastern side of the river downstream of a water pumping station. *GPS:* S18° 29' 52.6", E139° 17' 17.1";

*Altitude:* 54 m

*Geophysical setting:* Channel width was 10 m with a perennial flow, the riparian width 15 m, and with a 4 m vertical rise from the water to the transect position. Slumping occurred in 10% of the transect, and there was no gullying. The stream bed was rocky and the banks sandy. There was a fence 100 upstream, and a pumping station 50 m upstream, that supplied the house, and cattle tracks were parallel to the stream edge.

*Transect:* Transect was 100 m long by 15 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra*, with 15 mature individuals, 10-14 m tall, 4 subadults 8 m tall, and cover of 40%. Other significant species included *Pandanus spiralis* with 40% cover along the stream edge, *Ficus racemosa* with 15% cover, *Livistona rigida* with 10% cover and *Nauclea orientalis* with 5% cover. Fine woody debris accounted for 10-29 % of cover and coarse woody debris for 1-20% of cover. There were no deleterious weed species. TRARC score was 65.6, a rating of average condition.

Species recorded:

<i>Cardiospermum halicacabum</i>	<i>Melaleuca leucadendra</i>
<i>Chrysopogon oblongatus</i>	<i>Nauclea orientalis</i>
<i>Ficus racemosa</i>	<i>Pandanus spiralis</i>
<i>Livistona rigida</i>	<i>Xanthium occidentale</i>

#### 4.5 Gregory River – west of Tirranna Roadhouse

*Access:* Situated about 2 km west of the Tirranna Roadhouse on the Doomadgee/Burketown road, 200 m upstream of the causeway, on the eastern side of the river. *GPS:* S17° 53' 39.0", E139° 17' 07.5"; *Altitude:* 17 m

*Geophysical setting:* Channel width was 3 m with a perennial flow, the riparian width 8 m, and with a 2 m vertical rise from the water to the transect position. Slumping occurred in 10% of the transect, and there was no gullying. The stream bed was rocky and the banks sandy loam. There were no fences or waterpoints, and cattle tracks ran parallel to the stream.

*Transect:* Transect was 100 m long by 8 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with 11 mature individuals, 10-12 m tall, 1 subadult 7 m tall, and cover of 20%. Other significant species included *Casuarina cunninghamiana* and *Pandanus spiralis* with 20 % cover each, the latter confined to the stream edge, and *Nauclea orientalis* and *Terminalia canescens* each with 15 % cover. Fine woody debris accounted for 30-49 % of cover and course woody debris for 1-20% of cover. There were no deleterious weed species. TRARC score was 70.4, a rating of good condition.

Species recorded:

<i>Atalaya hemiglauca</i>	<i>Nauclea orientalis</i>
<i>Casuarina cunninghamiana</i>	<i>Pandanus spiralis</i>
<i>Chrysopogon oblongatus</i>	<i>Senna sp.</i>
<i>Crotalaria novae-hollandiae</i>	<i>Terminalia canescens</i>
<i>Excoecaria parvifolia</i>	<i>Vitex acuminata</i>
<i>Imperata cylindrica</i>	<i>Xanthium occidentale</i>
<i>Melaleuca leucadendra</i>	

#### 4.6 Beames Brook - Brinawa crossing

*Access:* Situated about 0.6 km west of Brinawa homestead on the Brinawa/Punjaub road, 200 m upstream from the crossing, on the eastern side of the stream.

*GPS:* S18° 09' 56.6", E139° 14' 22.0"; *Altitude:* 48 m

*Geophysical setting:* Channel width was 3 m with a perennial flow, the riparian width 10 m, and with a 2 m vertical rise from the water to the transect position. Slumping or gullying did not occur in the transect. The stream bed was loamy and the banks loamy. There were no fences or waterpoints, and cattle tracks ran parallel to the stream.

*Transect:* Transect was 100 m long by 10 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 75-89%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra*, with 12 mature individuals, 8-10 m tall, 2 saplings 2-3 m tall, and cover of 40%. Other significant species included *Livistona rigida* and *Nauclea orientalis* each with 15 % cover. Fine woody debris accounted for 10-29 % of cover and course woody debris for 1-20% of cover. The only deleterious weed species was *Cryptostegia grandiflora* (rubber vine) with 40 mature individuals of which 10 were climbing host trees, with 5% cover. TRARC score was 58, a rating of poor condition.

Species recorded:

<i>Cryptostegia grandiflora</i>	<i>Melaleuca leucadendra</i>
<i>Excoecaria parvifolia</i>	<i>Nauclea orientalis</i>
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	<i>Pandanus spiralis</i>
<i>Lysiphyllum cunninghamii</i>	<i>Terminalia canescens</i>
<i>Livistona rigida</i>	<i>Vitex acuminata</i>

#### 4.7 Beames Brook - downstream of Black Gully junction

*Access:* Situated about 0.7 km downstream of the Beames Brook/Black Gully junction on the eastern side of the stream, reached by a 2 km track that leaves the Gregory Downs/Burketown road 100 m north of the Black Gully crossing.

*GPS:* S18° 09' 08.3", E139° 14' 56.2"; *Altitude:* 46 m

*Geophysical setting:* Channel width was 3 m with a perennial flow, the riparian width 8 m, and with a 1 m vertical rise from the water to the transect position. Slumping did not occur in the transect, and gullying in 10%, with four 1 m wide gullies. The stream bed was loamy and the banks loamy. There were no fences or waterpoints, and cattle tracks ran mostly parallel to the stream, and some perpendicular.

*Transect:* Transect was 100 m long by 8 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 75-89 %, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with 18 mature individuals, and one subadult 4 m tall. Other significant species included *Excoecaria parvifolia* and *Vitex acuminata* each with 30% cover. Fine woody debris accounted for <10 % of cover and course woody debris for 1-20% of cover. The only deleterious weed species was *Cryptostegia grandiflora* (rubber vine) with one mature individual, one immature individual, with 1% cover. TRARC score was 52.1, a rating of poor condition.

Species recorded:

<i>Acacia bidwillii</i>	<i>Goodenia strangfordii</i>
<i>Alternanthera nodiflora</i>	<i>Melaleuca leucadendra</i>
<i>Cryptostegia grandiflora</i>	<i>Sporobolus</i> sp.
<i>Excoecaria parvifolia</i>	<i>Vitex acuminata</i>

#### 4.8 Beames Brook - Brookdale

*Access:* Situated about 2 km north of the Brookdale homestead, off the road on a 0.4 km long well formed track that ends at the stream, with the site on the eastern side of the stream. *GPS:* S18° 03' 50.2", E139° 15' 47.4"; *Altitude:* 32 m

*Geophysical setting:* Channel width was 7 m with a perennial flow, the riparian width 7 m, and with a 2 m vertical rise from the water to the transect position. Slumping occurred in 60% of the transect, and gullying in 10% with two 1-2 m wide gullies. The stream bed was loamy and the banks loamy. There were no fences or waterpoints, and cattle tracks ran parallel to the stream edge.

*Transect:* Transect was 100 m long by 7 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 75-89%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with 12 mature individuals, 10-11 m tall, and cover of 30%. Other significant species included *Livistona rigida* and *Excoecaria parvifolia* each with 20% cover, *Terminalia canescens* with 15% cover and *Nauclea orientalis* with 5% cover. Fine woody debris accounted for 10-29 % of cover and coarse woody debris for 1-20% of cover. The only deleterious weed species was *Cryptostegia grandiflora* (rubber vine) with four mature individuals all of which were climbing a host tree, and two immature individuals, with 5% cover. TRARC score was 52.7, a rating of poor condition.

Species recorded:

<i>Alternanthera nodiflora</i>	<i>Persicaria attenuata</i>
<i>Ceratophyllum demersum</i>	<i>Santalum lanceolatum</i>
<i>Cryptostegia grandiflora</i>	<i>Schoenoplectus mucronatus</i>
<i>Excoecaria parvifolia</i>	<i>Sporobolus</i> sp.
<i>Ipomoea</i> sp. (aquatic)	<i>Terminalia canescens</i>
<i>Livistona rigida</i>	<i>Vitex acuminata</i>
<i>Melaleuca leucadendra</i>	<i>Xanthium occidentale</i>
<i>Nauclea orientalis</i>	

#### 4.9 Beames Brook - upstream of Albert River junction

*Access:* Situated about 8 km upstream of Beames Brook/Albert River junction, 200 upstream from Burketown/Gregory Downs road crossing, on the eastern side of the stream. *GPS:* S17° 52' 47.8", E139° 20' 28.4"; *Altitude:* 14 m

*Geophysical setting:* Channel width was 4 m with a perennial flow, the riparian width 8 m, and with a 2 m vertical rise from the water to the transect position. Slumping occurred in 30% of the transect, and gullying in 10% with two 1-2 m wide gullies and one 5 m gully. The stream bed was rocky and the banks sandy loam. There were no fences or waterpoints, and cattle tracks ran parallel to the stream.

*Transect:* Transect was 100 m long by 8 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with 42 mature individuals, 8-10 m tall, and cover of 70%. Other significant species included *Pandanus spiralis* with 15 % cover confined to the stream bank, and *Casuarina cunninghamiana* and *Nauclea orientalis* each with 10% cover. Fine woody debris accounted for 30-49 % of cover and course woody debris for <1 % of cover. There were no deleterious weed species. TRARC score was 64.9, a rating of average condition.

Species recorded:

<i>Casuarina cunninghamiana</i>	<i>Nauclea orientalis</i>
<i>Chrysopogon oblongatus</i>	<i>Pandanus spiralis</i>
<i>Excoecaria parvifolia</i>	<i>Senna</i> sp.
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	<i>Sida acuta</i>
<i>Gymnathera oblonga</i>	<i>Vitex acuminata</i>
<i>Melaleuca leucadendra</i>	<i>Xanthium occidentale</i>

#### 4.10 Lawn Hill Creek -Big Lagoon

*Access:* Situated about 1 km downstream of the Lawn Hill Creek/Louie Creek junction; travelling towards Gregory Downs from Adels Grove, take track to left 1 km east of Louie Creek crossing, then follow rough track for 600 m to site which is on the southern side of the creek. *GPS:* S18° 41' 01.5", E138° 32' 19.5"; *Altitude:* 119 m

*Geophysical setting:* Channel width was 12 m with a perennial flow, the riparian width 7 m, and with a 3 m vertical rise from the water to the transect position. Slumping did not occur in the transect, and gullying in 5% with one < 1 m wide gully. The stream bed was rocky and the banks sandy. There were no fences or waterpoints, and cattle tracks ran parallel to the stream.

*Transect:* Transect was 100 m long by 7 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Lophostemon grandiflorus* with 42 mature individuals, 10 saplings 2-3 m tall, with 50 % cover. Other significant species included *Melaleuca leucadendra* with 20 % cover and *Lysiphyllum cunninghamii* with 15 % cover. Fine woody debris accounted for 50-74% cover and course woody debris for 1-20% of cover. There were no deleterious weed species. TRARC score was 69.3, a rating of average condition.

Species recorded:

<i>Capparis lasiantha</i>	<i>Lysiphyllum cunninghamii</i>
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	<i>Melaleuca leucadendra</i>
<i>Lophostemon grandiflorus</i>	<i>Vitex acuminata</i>

#### 4.11 Lawn Hill Creek - Lawn Hill Station

*Access:* Situated about 1 km downstream of Lawn Hill Station; travelling north on Adels Grove/Doomadgee road, at 1.2 km past Lawn Hill Station, take track to left for 200 m to Lawn Hill Creek, with the site on the eastern side of the creek.

*GPS:* S18° 34' 24.5", E138° 34' 58.7"; *Altitude:* 75 m

*Geophysical setting:* Channel width was 15 m with a perennial flow, the riparian width 10 m, and with a 4 m vertical rise from the water to the transect position. Slumping and gullying did not occur at this site. The stream bed was rocky and the banks sandy loam. There were no fences or waterpoints, and cattle tracks ran parallel to the stream.

*Transect:* Transect was 100 m long by 10 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with 22 mature individuals 14-15 m tall, four subadults 8-9 m tall, 18 saplings 2-

3 m tall, and cover of 55%. Other significant species included *Pandanus spiralis* with 30% cover restricted to the stream edge, and *Ficus racemosa* and *Nauclea orientalis* each with 10% cover. Fine woody debris accounted for 30-49 % of cover and course woody debris for 1-20% of cover. There were no deleterious weed species. TRARC score was 69.8, a rating of average condition.

Species recorded:

<i>Chrysopogon oblongatus</i>	<i>Melaleuca leucadendra</i>
<i>Clerodendrum floribundum</i>	<i>Nauclea orientalis</i>
<i>Ficus racemosa</i>	<i>Pandanus spiralis</i>
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	<i>Xanthium occidentale</i>
<i>Gymnathera oblonga</i>	

#### 4.12 Lawn Hill Creek - Bluewater Waterhole crossing

*Access:* Situated on Lawn Hill Creek, 200 m downstream of the Doomadgee/Punjaub road crossing, about 18 km from Burketown/Doomadgee road.

*GPS:* S18° 04' 18.1", E138° 54' 13.4"; *Altitude:* 9 m

*Geophysical setting:* Channel width was 4 m with a perennial flow, the riparian width 7 m, and with a 1 m vertical rise from the water to the transect position. Slumping occurred in 20% of the transect, and gullying in 5% with two 1 m wide gullies. The stream bed was rocky and the banks sandy. There were no fences or waterpoints, and cattle tracks ran parallel to the stream.

*Transect:* Transect was 100 m long by 7 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 75-89 %, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with five mature individuals, 7-8 m tall, 100+ saplings 1-2 m tall, and cover of 25%. Other significant species included *Excoecaria parvifolia* with 10 % cover, and *Melaleuca trichostachya*, *Terminalia canescens* and *Corymbia bella*, each with 5% cover. Fine woody debris accounted for 10-29 % of cover and course woody debris for 1-20% of cover. There were no deleterious weed species. TRARC score was 54.2, a rating of poor condition.

Species recorded:

<i>Corymbia bella</i>	<i>Melaleuca leucadendra</i>
<i>Cyperus</i> sp.	<i>Melaleuca trichostachya</i>
<i>Excoecaria parvifolia</i>	<i>Sida</i> sp.
<i>Flemingia</i> sp.	<i>Terminalia canescens</i>
<i>Imperata cylindrica</i>	<i>Vitex acuminata</i>
<i>Lobelia dioeca</i>	



#### 4.13 Running Creek - Almora

*Access:* Situated about 0.3 km downstream of the Burketown/Gregory Downs road crossing; take road to Almora which heads north-east about 100 m south of Running Creek, for 300 m, turn left toward creek (no track), where site is on the southern side of the creek. *GPS:* S18° 19' 27.6", E139° 15' 51.5"; *Altitude:* 54 m

*Geophysical setting:* Channel width was 4 m with a perennial flow, the riparian width 7 m, and with a 2 m vertical rise from the water to the transect position. Slumping occurred in 40% of the transect, and gullying in 20% with one < 1 m wide gully, and three 1-2 m wide gullies. The stream bed was muddy with loamy banks. There were no fences or waterpoints, and cattle tracks ran mainly parallel to the stream.

*Transect:* Transect was 100 m long by 7 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with 12 mature individuals, 10-11 m tall, and cover of 40%. Other significant species included *Ficus racemosa* and *Nauclea orientalis* each with 20% cover, and *Livistona rigida* and *Pandanus spiralis* each with 10% cover. Fine woody debris accounted for 30-49 % of cover and coarse woody debris for 1-20% of cover. The only deleterious weed species was *Cryptostegia grandiflora* (rubber vine) with four mature individuals, with 1% cover. TRARC score was 63.7, a rating of average condition.

Species recorded:

<i>Cayratia trifolia</i>	<i>Melaleuca leucadendra</i>
<i>Chrysopogon oblongatus</i>	<i>Nauclea orientalis</i>
<i>Cryptostegia grandiflora</i>	<i>Pandanus spiralis</i>
<i>Ficus racemosa</i>	<i>Persicaria attenuata</i>
<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>	<i>Vitex acuminata</i>
<i>Gymnathera oblonga</i>	<i>Xanthium occidentale</i>
<i>Livistona rigida</i>	

#### 4.14 One Mile Creek - Punjab

*Access:* Situated about 6 km west of the Beames Brook crossing at Brinawa on the Brinawa/Punjab road, with the site 200 m upstream of the crossing over One Mile Creek, on the western side of the creek. *GPS:* S18° 09' 42.1", E139° 13' 35.8";

*Altitude:* 52 m

*Geophysical setting:* Channel width was 5 m with a perennial flow, the riparian width 8 m, and with a 1 m vertical rise from the water to the transect position. Slumping occurred in 40% of the transect, and gullying in 10% with two 1 m wide gullies. The stream bed was muddy

and the banks loamy. There were no fences or waterpoints, and cattle tracks ran parallel to the stream edge.

*Transect:* Transect was 100 m long by 8 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 75-89%, with 5-25% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca leucadendra* with eight mature individuals, 5-7 m tall, and cover of 30%. Other significant species included the shrub *Vitex acuminata* with 60% cover primarily beneath *M. leucadendra*, and *Terminalia canescens* with 1% cover. Fine woody debris accounted for 10-29 % of cover and course woody debris for <1% of cover. There were no deleterious weed species. TRARC score was 54.4, a rating of poor condition.

Species recorded:

<i>Acacia bidwillii</i>	<i>Ottelia alismoides</i>
<i>Alternanthera nodiflora</i>	<i>Sida acuta</i>
<i>Ceratophyllum demersum</i>	<i>Terminalia canescens</i>
<i>Chrysopogon oblongatus</i>	<i>Vallisneria nana</i>
<i>Goodenia strangfordii</i>	<i>Vitex acuminata</i>
<i>Melaleuca leucadendra</i>	<i>Xanthium occidentale</i>

#### 4.15 Elizabeth Creek – Lawn Hill Station

*Access:* Situated on the Doomadgee/Punjaub road, about 16 km south-east of the Burketown/Doomadgee road junction, about 100 m upstream of the crossing on the northern side of the creek. *GPS:* S18° 03' 55.5", E138° 54' 22.8"; *Altitude:* 46 m

*Geophysical setting:* Channel width was 5 m with an annual flow, the riparian width 7 m, and with a 2 m vertical rise from the water to the transect position. Slumping occurred in 10% of the transect, and gulying in 5% with one 1 m wide gully. The stream bed was muddy and the banks loamy. There were no fences or waterpoints, and cattle tracks ran parallel to the stream edge.

*Transect:* Transect was 100 m long by 7 m wide, placed contiguous and parallel to the stream edge.

*Vegetation:* Linear continuity of vegetation was 90-100%, with <5% standing dead vegetation, and with no evidence of clearing. The dominant species was *Melaleuca argentea* with 11 mature individuals, 4-7 m tall, 18 subadults 2-3 m tall, 30 saplings 1-2 m tall, and cover of 50%. Other significant species included *Excoecaria parvifolia* and *Corymbia bella*, each with 15% cover. Fine woody debris accounted for 10-29 % of cover and course woody debris for 1-20% of cover. There were no deleterious weed species. TRARC score was 64.3, a rating of average condition.

Species recorded:

<i>Chrysopogon oblongatus</i>	<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>
<i>Digitaria</i> sp.	<i>Melaleuca argentea</i>
<i>Excoecaria parvifolia</i>	<i>Xanthium occidentale</i>
<i>Corymbia bella</i>	

## 5.0 SUMMARY

The median ratio of the width of the channel to the width of the riparian zone was 0.7; eleven sites had a ratio of 0.7 or less, and four had a ratio greater than 0.7, i.e. making the riparian zone consistently narrower than the width of the channel at the study sites, and indeed structurally representing a narrow ribbon of vegetation along stream edges. This is the common condition of watercourses in areas of monsoonal or strong seasonal rainfall in tropical Australia, and can be accounted for by water requirements of riparian species in a seasonal rainfall environment, and not necessarily the geophysical morphology of the streams and soil types and conditions. Within the Gregory River catchment where the sites were located, there is considerable variation in soil conditions ranging from alluvial river sands to dark clay loams, and there appears to be no direct relationship between riparian width and edaphic conditions.

The most dominant riparian species recorded was *Melaleuca leucadendra*, occurring in 14 of the 15 sites and with a total cover of 41.3%. The average number of mature individuals at each site where they occurred was 18, which placed them at an average linear separation of 5.7 m. The estimated height range of mature *M. leucadendra* was 5-16 m, with an average at all sites of 9.6 m. This range of estimated heights may reflect soil types or degree of water saturation into the bank substrate. The site at Beames Brook, upstream from the Albert River junction, had the greatest density with 42 mature individuals recorded in the 100 m transect. The second most dominant species was *Pandanus spiralis* occurring at seven sites, with a total cover of 16.3%. Other dominant species included *Nauclea orientalis* and *Ficus racemosa* each with a cover of 7%, and *Livistona rigida* with a cover of 4.7%. The shrub *Vitex acuminata* was very common as an understorey element at three sites, including Beames Brook at Brookdale, Running Creek and One Mile Creek.

The only deleterious weed recorded was *Cryptostegia grandiflora* (rubber vine), at six of the 15 sites. The number of mature individuals ranged from one [Beames Brook, Black Gully junction and Gregory River, Gregory Downs] to 40 at Beames Brook, Brinawa Crossing. Rubber vine was more or less confined to a discrete area centred on three of the four Beames Brook sites, nearby Running Creek, and two upstream sites on the Gregory River.

The understorey vegetation was limited because of seasonal effects; there were no annuals present [including both herbs and grasses] and all perennial grasses had browned-off or were reduced to subterranean shoots. The effects of cattle browsing and/or trampling on the remaining understorey species were evident in many sites.

The Tropical Rapid Appraisal of Riparian Condition method was applied to all sites. Based on the TRARC scores, five sites were in the poor category, eight sites were in the average category and two sites in the good category. Cattle were present at all sites, although no relationship between estimated stocking rates and the TRARC score was evident.

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**Appendix 1:** Taxonomic list of plant species in the riparian zone of 15 study sites in the Gregory River catchment, recorded in 100 m x 5-20 m transects, parallel to stream edge, 10-16 August 2004.

<p><i>Acacia stenophylla</i> A.Cunn. ex Benth.  <i>Acacia torulosa</i> Benth.  <i>Acacia farnesiana</i> (L.) Willd.  <i>Achyranthes aspera</i> L  <i>Alternanthera nodiflora</i> R.Br.  <i>Atalaya hemiglauca</i> (F.Muell.) F.Muel. ex Benth.  <i>Lysiphyllum cunninghamii</i> (Benth.) de Wit  <i>Calytropis procera</i> (Aiton) W.T.Aiton  <i>Capparis lasiantha</i> R.Br. ex DC  <i>Cardiospermum halicacabum</i> L.  <i>Casuarina cunninghamiana</i> Miq.  <i>Cayratia trifolia</i> (L.) Domin  <i>Ceratophyllum demersum</i> L.  <i>Chrysopogon elongatus</i> (R.Br.) Benth.  <i>Clerodendrum floribundum</i> R.Br.  <i>Corymbia bella</i> K.D.Hill &amp; L.A.S.Johnson  <i>Corymbia</i> sp.  <i>Crotalaria</i> sp.  <i>Cryptostegia grandiflora</i> R.Br.  <i>Cyperus</i> sp.  <i>Digitaria</i> sp.  <i>Erythrophleum chlorostachys</i> (F.Muell.) Baill.  <i>Eucalyptus microtheca</i> F.Muell.  <i>Excoecaria parvifolia</i> F.Muell.  <i>Ficus racemosa</i> L.  <i>Flemingia</i> sp.  <i>Flueggea virosa</i> subsp. <i>melanthesoides</i> (F.Muel.) G.L.Webster</p>	<p><i>Goodenia strangfordii</i> F.Muell.  <i>Gymnathera oblonga</i> (Burm.f.) P.S.Green  <i>Imperata cylindrica</i> (L.) Raeusch.  <i>Ipomoea</i> sp (aquatica?)  <i>Limnophila brownii</i> Wannan  <i>Livistona rigida</i> Becc.  <i>Lobelia dioeca</i> R.Br.  <i>Lophostemon grandiflorus</i> (Benth.) Peter G.Wilson &amp; J.T.Waterh.  <i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven  <i>Melaleuca argentea</i> W.Fitz.  <i>Melaleuca bracteata</i> F.Muell.  <i>Melaleuca leucadendra</i> (L.) L.  <i>Nauclea orientalis</i> (L.) L.  <i>Nymphaea gigantea</i> Hook.  <i>Nymphoides crenata</i> (F.Muell.) Kuntze  <i>Ottelia alismoides</i> (L.) Pers.  <i>Pandanus spiralis</i> R.Br.  <i>Persicaria attenuata</i> (R.Br.) Sojak  <i>Santalum lanceolatum</i> R.Br.  <i>Schoenoplectus mucronatus</i> (L.) Palla ex J.Kern.  <i>Senna</i> sp.  <i>Sida acuta</i> Burm.f.  <i>Sporobolus caroli</i> Mez  <i>Terminalia canescens</i> (DC) Radlk. ex T. Durand  <i>Vallisneria nana</i> R.Br.  <i>Vitex acuminata</i> R.Br.  <i>Xanthium occidentale</i> Bertol.</p>
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