Nathan Dam and Pipeline Project:

Fitzroy River Turtle Survey

September – October 2012

Prepared for:

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1 Introduction and Survey Description

In September 2011, SunWater commissioned frc environmental to survey the distribution of the Fitzroy River turtle (*Rheodytes leukops*) in the Dawson River across the proposed Nathan Dam study area.

Surveys were conducted over eight days commencing the 27 September. Dawson River sites were surveyed upstream of the proposed dam site, beginning at Glebe Weir, through the proposed inundation area and upstream of the proposed inundation area. Sites downstream of Glebe Weir were not surveyed because of releases from the weir at the time of survey affecting conditions downstream through increased flow and turbidity. Sites were also surveyed on the Cockatoo Creek tributary within and upstream of the inundation area (Figure 1.1). Details of sites surveyed are presented in Appendix A.

Conditions throughout the survey area were generally fine; however, water clarity was poor, in part because of rainfall within the catchment before the survey. In-water visibility was a maximum of approximately 0.5 m depth and 1.5 m horizontally, parallel to the water's surface, restricting the effectiveness of capture methods. Temperatures (air) ranged from 4.7 °C over night, to 29 °C during most days, while daily rainfall ranged between 0 and 0.8 mm at Taroom.

A total of eight sites were surveyed (Table 1.1). All sites were surveyed during the day and at night. At each site, surveys consisted of a combination of

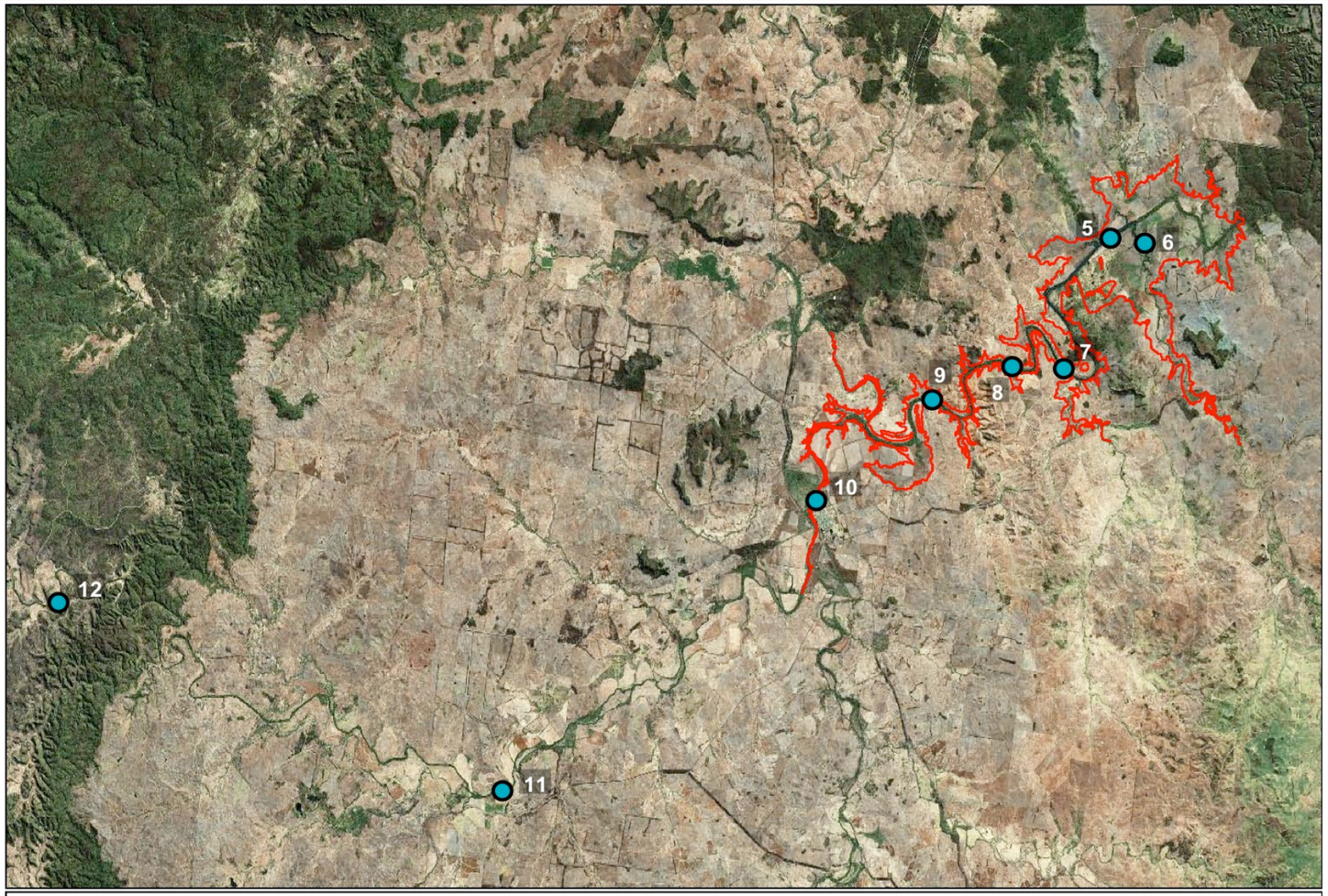
- muddling
- dip-netting
- evening spotlighting
- pole camera, and
- ad-hoc observation.

The suite of methods employed was dependent on the conditions encountered at each site. A summary of the sampling methods and effort at each site is presented in Table 1.1.

The focus of this survey was to assess the presence, distribution and reproductive / nesting status of the Fitzroy River turtle in the Nathan Dam study area, so the sampling effort at each site was generally less than would be required to determine, for example, total abundance. The absence of Fitzroy River turtles at sites cannot be considered

definitive for the area as the effectiveness of the preferred survey techniques for Fitzroy River turtles (spotlighting and snorkelling) was constrained by poor visibility.

When turtles were captured they were palpated and examined, using ultrasound, for the presence of eggs and mature follicles (which become eggs). Visual searches for nests and eggshells and the use of ultrasound are effective, but not infallible, methods and it is possible that reproductive activity was more widespread than was observed during the survey.



frc environmental AQUATIC ECOLOGISTS deep thinking.science.	110812	Nathan Dam and Pipeline: Fitzroy River Turtle Survey	
	Figure 1.1 Location of sites surveyed in September – October 2011.		
	Bing Aerial 2011, Sunwater Pty. Ltd.	WGS84	October 2011

Table 1.1 Sampling effort in September – October 2011.

Site	Waterway	Night Sampling	Day Sampling	Effort [1] (person hours)
5	Dawson River	spotlight, dip net	Observation	6.90
6	Cockatoo Creek	spotlight, dip net	Observation	4.20
7	Dawson River	spotlight, dip net, pole camera	Observation	8.10
8	Dawson River	spotlight, muddle, pole camera, dip net	Observation	6.90
9	Dawson River	spotlight, dip net	Observation	7.50
10	Dawson River	spotlight, muddle, dip net	Observation	7.50
11	Dawson River	spotlight, dip net	Observation	6.75
12	Dawson River	spotlight, muddle dip net, snorkel	Observation	6.00

[1] Hours based on a survey team of three staff. Does not include egg and nest search.

Figure 1.2

Dip-netting on foot in deep water at site 8.

Figure 1.3

Using the pole camera at site 8.

Figure 1.4

Krefft's turtle caught with dipnet at site 7.

2 Results

2.1 Habitat

Habitat that was surveyed included

- shallow pools
- deep pools
- riffles, and
- runs.

Riparian vegetation was intact at all sites, with most dominated by mature forests. Banks varied from gentle to steeply sloping earth; grasses and weeds were generally sparse, with bare ground and evidence of stock access. Bed substrates were predominantly fine silts and sand with some pebbles and cobbles at upstream sites. Most sites had elements of large woody debris. The river varied from wide and deep upstream of weir pools, to comparatively narrow elsewhere. Sites unaffected by weir pools showed some braiding, with banks damaged by earlier flooding.

The occurrence, or lack, of turtles (including the Fitzroy River turtle) was not considered a definitive indication of distribution, as suitable habitat was present within many of the more substantial reaches surveyed.

The habitat values of each site surveyed are presented in Appendix A.

2.2 Fitzroy River Turtle

Fitzroy River turtle (*Rheodytes leukops*) were not sighted [1] or captured in the survey area.

Anecdotal information from local residents indicated that Fitzroy River turtles have not been seen in the region recently. However, identification of turtles by locals may be unreliable.

[1] sightings refer to *confirmed sightings*, where the observer was able to get to within approximately 1 m of the turtle

2.3 Carapace, Eggs and Eggshell

Eggshells were photographed and collected at sites 8 and 9 (Table 2.1). Based on the size of the majority of the eggshells, it was considered possible that some of the collected shells were from Fitzroy River turtles or Krefft's River turtles[2]. Four nests were observed at site 8 and a single nest was observed at site 9.

Three Krefft's River turtle carapaces were observed, one each at site 5, site 6 and site 12.

Figure 2.1

Eggshells and nest on right bank at site 8.

Figure 2.2

Eggshells on right bank at site 8.

[2] eggshells will be provided to Dr Colin Limpus, DERM, for species confirmation if required

Table 2.1 Eggs, eggshell and nests observed at sites in September and October 2011.

Site	Total Egg Clusters	No. of Shells	Total Nests Observed	Habitat	Predation	Notes
8	3	~5	1	silt / sand	unknown	approximately 2 m from water, on steep bank, possibly from previous season
8	3	~8	1	silt / sand	unknown	approximately 6 m from water, leaf litter present
8	3	5	0	sand	unknown	shells only, approximately 10 m from water, leaf litter present
9	1	1 partial	1	fine earth – silt	unknown	nest shallow, approximately 2 m from water, leaf litter present

2.4 Other Turtles

The white-throated snapping turtle (*Elseya albagula*), and Krefft's River turtle (*Emydura macquarii krefftii*) were in the survey area. One unidentified turtles were at site 5, one unidentified turtle was at site 6 and one unidentified turtle was at site 7. These turtles were observed from a distance and therefore species identification could not be confirmed.

Details of other turtle abundance at each site are presented in Table 2.2.

Table 2.2 Other turtle species at sites in September and October 2011.

Site	*Elseya albagula*			*Emydura m. krefftii*			Sampling Method
	Sex	Size (cm)[a]	Weight (kg)	Sex	Size (cm)[a]	Weight (kg)	
5	–	–	–	unknown	medium	–	observation
5	–	–	–	unknown	medium	–	Observation
6	–	–		unknown	medium	–	observation
6	–	–		unknown	medium	–	observation
7	unknown	medium	–	–	–	–	observation
7	–	–		unknown	medium	–	observation
7	–	–		unknown	medium	–	observation
7	–	–		unknown	medium	–	observation
7	–	–		female	25.3	2.1	dip net
7	–	–		female	26.2	2.05	spotlight
8	–	–		unknown	–	–	observation
8	–	–		unknown	–	–	observation
8	–	–		unknown	–	–	observation

[a] size of turtles was a visual estimate only. Size classes are: small <15 cm, medium 15–30 cm and large >30 cm

Figure 2.3

Krefft's River turtle caught at site 7.

Appendix A Habitat Description for Individual Sites.

Site	Description	Photograph	
Site 5 – Glebe Weir Easting: 199053 Northing: 7178603 Zone: 56J	Site was wide (>100 m) and deep (>2 m). Banks were stable. Riparian vegetation was between 20 m and 25 m wide on the left and right banks respectively. It was dominated by eucalypts <10 m tall. In-stream habitat included some large woody debris and small woody debris, with traces of overhanging vegetation, trailing vegetation, in-stream vegetation and detritus. The substrate along the margins was dominated by silt / clay and sand.	 View upstream	 View of typical bank structure
Site 6 – Cockatoo Creek Easting: 201855 Northing: 7179047 Zone: 56J	Site was wide (50 m) and deep (~2 m). Banks were stable with riparian vegetation consisting of eucalypt trees <10 m tall. Understorey vegetation was sparse and banks consisted of silty earth covered by leaf litter. In-stream habitat comprised small and large woody debris, with traces of overhanging vegetation, trailing vegetation, and in-stream vegetation including roots and detritus. The substrate along the margins consisted of sand and silt / clay.	 View across creek	 View of typical bank structure and Krefft's turtle carapace

Site	Description	Photograph	
Site 7 – Bentley Easting: 798661 Northing: 7171427 Zone: 55J	Site was wide (125 m) and moderately deep (>1.5 m). Riparian vegetation was 30 m wide on the left bank and 15 m wide on the right bank. It comprised Eucalypt <10 m tall. Understorey vegetation was sparse, with lots of bare ground and evidence of extensive cattle access. In-stream habitat included large and small woody debris with traces of overhanging and in-stream vegetation, including roots. The substrate was dominated by sand and silt / clay.	 View upstream	 View downstream
Site 8 – Bookabie Easting: 795281 Northing: 7170868 Zone: 55J	Site was moderately wide (25 m) and deep (~0.8 m). Banks were moderately stable, with some evidence of erosion during earlier flooding. Riparian vegetation width was 40 m and 30 m on the left and right banks respectively. The vegetation was dominated by Eucalypt trees <10 m tall. In-stream habitat included overhanging vegetation, small and large woody debris, with traces of trailing bank vegetation, and in-stream vegetation including roots and detritus. The substrate was dominated by silt / clay and sand with some gravel.	 View upstream	 View downstream

Site	Description	Photograph	
Site 9 – Bundulla Easting: 787795 Northing: 7168568 Zone: 55J	Site was moderately wide (30 m) and deep (0.8 m). Banks were moderately stable and consisted of silt / clay soil. Riparian vegetation was 8 m wide on the left bank and 15 m wide on the right bank. It consisted of Eucalypt and Melaleuca trees generally <10 m. In-stream habitat included large and small woody debris, with overhanging and trailing bank vegetation and detritus. The substrate was dominated by sand and gravel with some boulders, cobbles and pebbles.	 View of typical bank structure	 View downstream
Site 10 – Taroom Easting: 780013 Northing: 7161482 Zone: 55J	Site was moderately wide (25 m) and deep (0.8 m). Banks were sloping and moderately stable. Riparian zone width was 15 m on the left bank and 10 m on the right bank. Riparian vegetation was dominated by Eucalypts and Melaleuca trees <10 m tall. In-stream habitat consisted of large and small woody debris, some trailing bank and overhanging vegetation and detritus. The substrate was dominated by sand and cobbles with some boulders, pebbles and gravel.	 View upstream – right braid	 View downstream

Site	Description	Photograph	
Site 11 – Tarana Crossing (Injune-Roma Connection Road) Easting: 756625 Northing: 7144245 Zone: 55J	Site was relatively narrow (20 m) and deep (1 m). Banks ranged between sloping and vertical, with areas of erosion present. In-stream habitat was dominated by large and small woody debris with some overhanging and trailing bank and in-stream vegetation including roots and detritus. Riparian zone was narrow, 5 m and 10 m on the left and right banks respectively. Riparian vegetation consisted of Eucalypts, Lomandra and castor oil plants. The substrate was dominated by sand with some cobble, pebble and gravel.	 View upstream	 View downstream
Site 12 – Baroondah Crossing Easting: 722285 Northing: 7156515 Zone: 55J	Site was moderately wide (30 m) with deep (>1 m) and shallow (<0.5 m) areas. Riffle, run and pool habitats were present. Banks were moderately stable and ranged between sloping and vertical. There was evidence of recent bank erosion from previous high flow events. Riparian zone was narrow, 5 m on the left bank and 10 m on the right bank. Riparian vegetation was a combination of Callistemon and Eucalypt trees generally <10 m tall. In-stream habitat included overhanging vegetation, large and small woody debris, with some boulders, cobbles, trailing bank vegetation and detritus. The substrate was dominated by sand, with cobble, pebble and gravel.	 View of nesting habitat	 View of typical bank structure

Appendix B Assessment of Available Turtle Nesting Habitat

Potential turtle nesting habitat was mapped through an assessment of satellite imagery and on-site observations. This provides an effective evaluation of potential nesting habitat; however, due to limitations associated with vegetation cover in satellite images and the difficulty of assessing large areas on-site, it is unlikely to represent all potential nesting habitat at each site or along the stretch of the Dawson River from Glebe Weir to Baroondah Crossing.

In general, potential nesting habitat was limited at most sites due to:

- hard, compacted earth caused by cattle access
- scouring of loose earth and sand on banks in the floods in early 2011, and
- extensive weed growth along the banks.

Site 5

There were three areas of potential nesting habitat on the left bank and none on the right bank at site 5 (Figure B1). No nests or eggs were found at site 5 during this survey.

frc environmental AQUATIC ECOLOGISTS deep thinking. science.	110812	Nathan Dam and Pipeline: Fitzroy River Turtle Survey	
	Figure B1 Available nesting habitat at site 5.		
	Adapted from Nearmap 2011	WGS84	October 2011

Site 6

Four small areas of potential turtle nesting habitat were found at site 6 (Figure B2). No nests or eggs were found at site 6 during this survey.

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	Figure B2 Available nesting habitat at site 6.		
	Adapted from Nearmap 2011	WGS84	October 2011

Site 7

A large area of potential turtle nesting habitat was along the right bank at site 7 (Figure B3). However, there was extensive cattle activity along this area of the Dawson River. No nests or eggs were present at site 7 during this survey.

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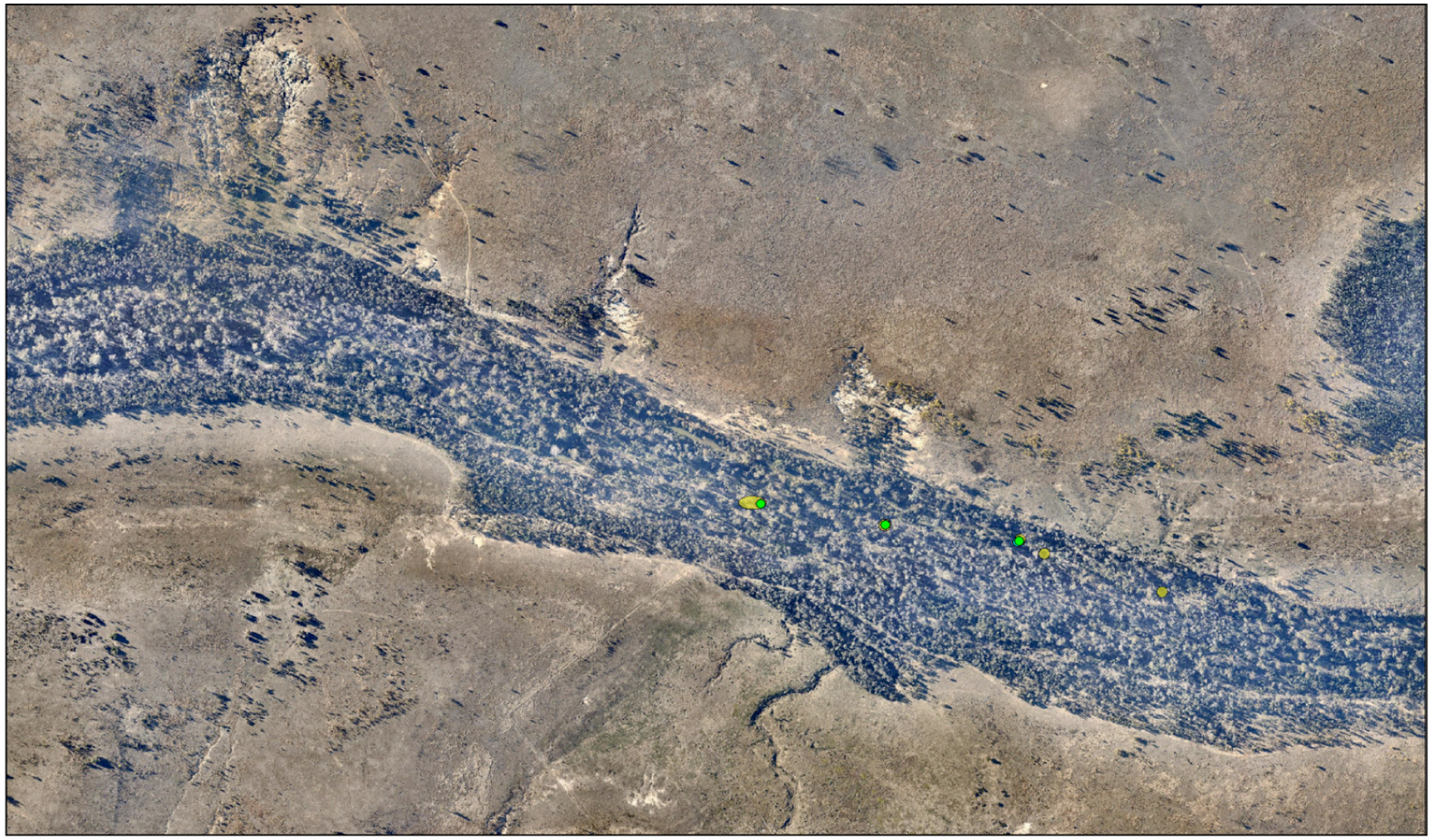
	Figure B3 Available nesting habitat at site 7.		
	Adapted from Nearmap 2011	WGS84	October 2011

Site 8

Several small patches of potential turtle nesting habitat were at site 8 (Figure B4). Three nests with hatched or predated eggs and one nest without eggs were at site 8 during this survey.



frc environmental AQUATIC ECOLOGISTS deep thinking. science.	110812		Nathan Dam and Pipeline: Fitzroy River Turtle Survey
	Figure B4 Available nesting habitat at site 8.		
	Adapted from Nearmap 2011	WGS84	October 2011

Site 9

Two small areas of potential turtle nesting habitat were at site 9, on either side of the road crossing (Figure B5). One nest without eggs was within the area of nesting habitat downstream of the road crossing during this survey.

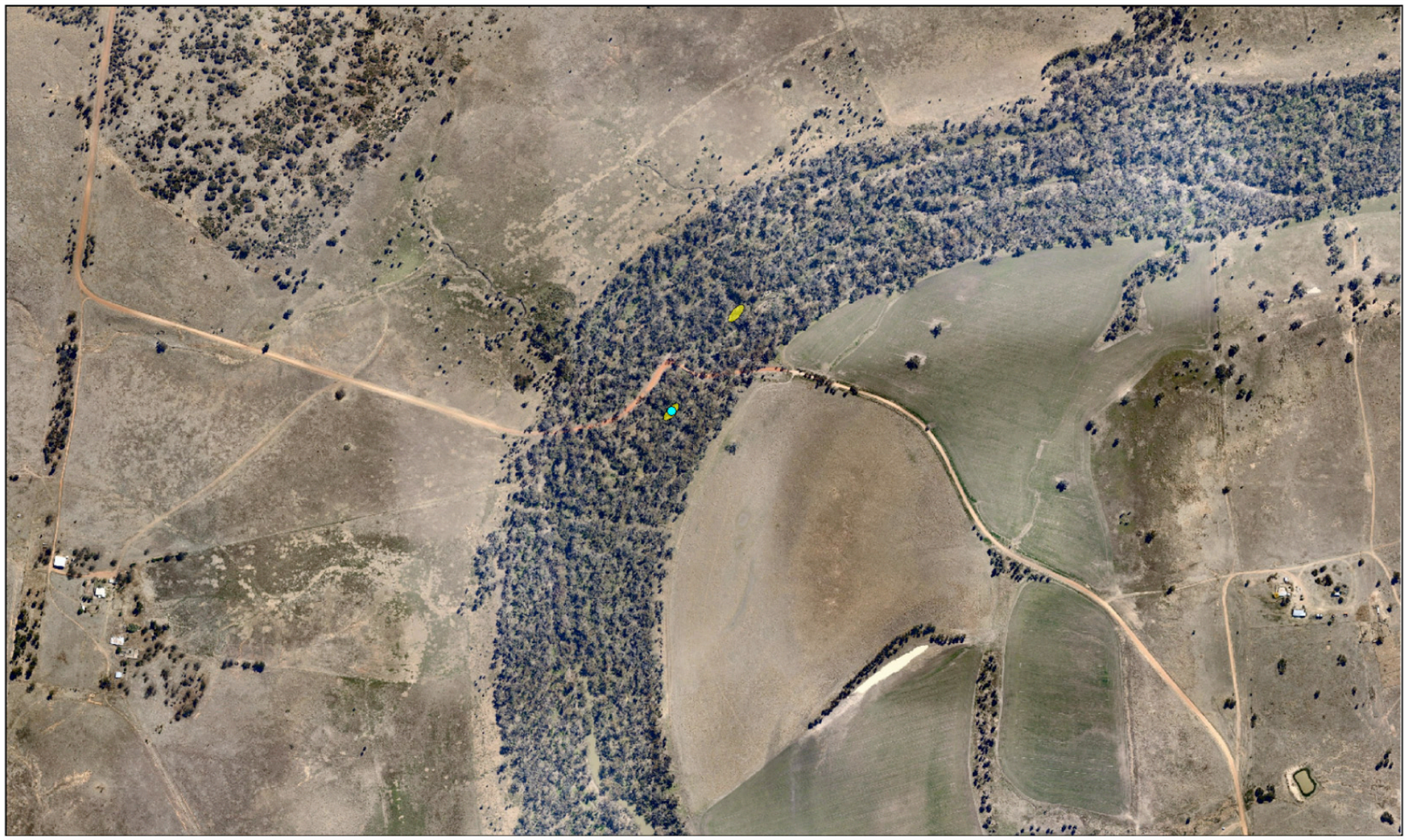


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	Figure B5 Available nesting habitat at site 9.		
	Adapted from Nearmap 2011	WGS84	October 2011

Site 10

No potential nesting habitat was observed at site 10 during this survey.

Site 11

Several small patches of potential turtle nesting habitat were at site 11 (Figure B6). One nest without eggs was on the left bank downstream of the road crossing during this survey.

Legend

- Potential nesting habitat
- Nest without eggs

0 200 400
Metres

N

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	Figure B6 Available nesting habitat at site 11.		
	Adapted from Nearmap 2011	WGS84	October 2011

Site 12

Two small patches of potential turtle nest habitat were at site 12 (Figure B7). However, no nests were present within these areas during this survey.

Legend

Potential nesting habitat

0 200 400

Metres

N

frc environmental AQUATIC ECOLOGISTS deep thinking. science.	110812		Nathan Dam and Pipeline: Fitzroy River Turtle Survey
	Figure B7 Available nesting habitat at site 12.		
	Adapted from Google Earth Pro	WGS84	October 2011