

SunWater
Nathan Dam And Pipelines Project
Pre-Wet Season Field Survey: Turtles
And Water Quality

October 2008



CERTIFICATE OF APPROVAL FOR ISSUE OF DOCUMENTS

Report Title: Pre-wet Season Field Survey: Turtles and Water Quality

Document Status: Final

Document No: CQ210609-EE2008-68

Date of Issue: 27/01/09

Project Title: Nathan Dam and Pipelines Project

Client: SunWater

Comments:

	Position	Name	Signature	Date
Prepared by:	Senior Aquatic Ecologist	Penny Gleeson		23/10/08
Internal Review by:	Senior Aquatic Ecologist	Gavin Williams		28/10/08
Peer Review by:				
Approved by:	Principal Consultant	Chris-Pipe Martin		7/11/08

For further information on this report, contact:

Name: Penny Gleeson
 Title: Senior Aquatic Ecologist
 Address: 10/44 Station Road
 Yeerongpilly, 4105

 Phone: 07 3859 7805
 Mobile: 0439 316 832
 E-mail: pgleeson@ecowise.com.au

Document Revision Control

Version	Description of Revision	Person Making Issue	Date	Approval

© Ecowise Australia Pty Ltd

Disclaimer

This document has been prepared for the Client named above and is to be used only for the purposes for which it was commissioned. No warranty is given as to its suitability for any other purpose.

Ecowise Australia Pty Ltd ABN 94 105 060 320

Table of Contents

1	Introduction	1
1.1	Background	1
1.2	Project Aims	1
2	Survey Design Description	2
2.1	Study Area	2
2.2	Site Locations	2
3	Methodology	4
3.1	Turtles	4
3.2	Water Quality	4
3.3	Aquatic Habitat Description	5
4	Data Summaries	6
4.1	Sampling Effort	6
4.2	Turtles	7
4.3	<i>In situ</i> Water Quality	7
4.4	Laboratory Analysed Measurements	8
4.5	Aquatic Habitat Description	8
5	Survey Quality Assurance	9
6	References	10

List of Tables

Table 1 Comparison of sampling effort Pre-wet October 2008 turtle & water quality field survey	6
Table 2 <i>In situ</i> Water Quality Pre-wet October 2008 turtle & water quality field survey.....	7

Appendices

- Appendix A – State of the Rivers fieldsheets – complete**
- Appendix B – Laboratory Analysed Results from ALS**

1 Introduction

1.1 Background

The Nathan Dam and Pipelines Project includes the construction and operation of Nathan Dam at 315.3 km AMTD on the Dawson River (approx 25° 29'S 150° 09'E) in central Queensland. The Project also includes a pipeline to the Surat Basin to supply the coal mining and power generation sectors.

An Impact Assessment Study (IAS) on the site was released in October 1997. At that stage a number of Full Supply Levels (FSLs) were still being considered, ranging from 170 m to 185 m. Further, the dam wall location was originally at 314 km AMTD, but was moved to 315.3 km AMTD in order to avoid sensitive areas near the proposed wall.

The 185 m AHD FSL option at 315.3 km AMTD has been selected as the preferred option for the current investigation. This will create an 880,000 ML storage which will flood 75 km of the Dawson River.

This report outlines field survey and data reporting tasks of the Pre-Wet Season Field Survey: Turtles and Water Quality. The data and report will provide the basis for possible replication of the work and will serve as input to the Existing Environment component of the EIS.

1.2 Project Aims

The aim of the Pre-wet Season Field Survey: Turtles and Water Quality was to undertake standard field surveys, including:

- Turtles – targeting *Rheodytes leukops* (Fitzroy River Turtle)
- Water quality
- Aquatic habitat - limited

The survey design and reporting was designed by SunWater to allow replication at a future date without the need to refer to other information.

2 Survey Design Description

2.1 Study Area

Eighteen permanent or intermittent tributaries enter the proposed inundation area, the largest being Cockatoo Ck. These tributaries include:

- Kungay Mungay Ck
- Palm Tree Ck
- Scotchy Ck
- Grass Tree Ck
- Blackboy Ck
- Double Stable Yard Gully
- Scrubby Ck
- Bentley Ck
- Binghi Ck
- Spring Gully
- Cockatoo ck
- Spring Ck

The natural river channel of the Dawson River is characterised by a series of long and deep relatively permanent pools. The middle and lower reaches are long and winding and are characterised by very low gradient. The upstream limit of the proposed dam to its junction with the Fitzroy River has a fall of 150 m over 425 km).

The Nathan Gorge area is not related to falls or rapids, but to a narrowing of the floodplain as the river cuts through different bed material. The existing Glebe Weir would be flooded by the dam. Gylanda Weir and Orange Creek Weir exist some 30 and 45 km downstream respectively. When full, Gylanda Weir backs up through the gorge to the dam site. The weirs are not fitted with fishways.

The storage will back up to the town of Taroom, the only town in the immediate catchment, and will extend into several tributaries.

2.2 Site Locations

Sites sampled for this sampling program were a sub-set of the sixteen sites proposed for the Post-wet survey conducted by Ecowise in June 2008 (Ecowise, 2008). Seven sites were chosen for turtle surveys in the main Dawson River channel, within and outside the inundation area.

The following sites were sampled for turtles:

- 1 site above the inundation area on the main channel (Site 1)
- 4 sites within the inundation area on the main channel (Sites 2 – 5)
- 2 sites below the dam on the main channel (Sites 6 & 7)

Seven sites were chosen for analytical water quality sampling. The same sites were previously sampled during the Post-wet season program (June 2008). Sites 1 – 6 are in the main Dawson River channel, site 13 is located on Bentley Creek. Site locations and access information is presented in Ecowise, 2008.

Water Quality samples were collected from the following sites:

- 1 site above the inundation area on the main channel (Site 1)
- 5 sites within the inundation area on the main channel (Sites 2, 3, 4, 5 & 13)
- 1 site below the dam on the main channel (Site 6)

3 Methodology

The methods used were based upon quote 08SW3512 Aquatic Survey variation: Pre-wet Season 2008 – Nathan Dam and Connors River Dam and Pipelines.

3.1 Turtles

Turtles were targeted at Sites 1 – 7 on the Dawson River. Trapping was not used due to the knowledge that *R. leukops* rarely come to baited traps (Limous *et al.*, 2007). No snorkelling was able to be undertaken at any sites due to high turbidity.

Dip netting was conducted as close to dawn or dusk as practical at all sites. A spotlight was used to scan the water surface in front of a canoe travelling at a slow speed. Attempts were made to capture turtles using a hand help dip net when observed.

Seine netting was undertaken at all sites, except site 6 due to unsuitable depth for wading and a narrow channel with multiple snags preventing the use of the canoe for deployment. Using seine nets was generally ineffective in the habitat presented at each site, with steeply sloping banks, deep water and snags making deployment difficult. The seine net was not always able to be deployed to full length due to snags. Using the canoe to deploy the seine net was attempted, the method was ineffective as the net was difficult to manoeuvre and generated noise that may have scared away turtles.

Identification of turtles using Cogger (2000) was unable to be carried out as no turtles were captured or observed closely enough due to the highly turbid water.

Ecowise has a current Ethics Permit (CA 2008-04-261) for the scientific collection of turtles.

3.2 Water Quality

3.2.1 *In situ* Spot Measurements

In situ water quality measurements were collected by the field team at each site using a current model Hydrolab Minisonde MS5a multiparameter water quality meter coupled to Surveyor 4 display. This unit was calibrated in the laboratory in accordance with Ecowise quality systems requirements and the manufacturer's specifications prior to deployment in the field. Calibration standards were also carried with the field team to conduct spot checks on the unit throughout the course of the field program to ensure accuracy and reliability of the results. *In situ* measurements included:

- water temperature (°C),
- pH,
- electrical conductivity (µS/cm),
- dissolved oxygen (mg/L and %saturation) and
- turbidity (NTU).

In addition, secchi depth (m) was measured using a standard secchi disk, where possible.

3.2.2 Laboratory Analysed Measurements

Samples were collected from Sites 1, 2, 3, 4, 5, 6, and 13 across one day and couriered within 48 hours to the laboratory for analysis. The Australian Laboratory Service (ALS) in Brisbane was sub-contracted to complete the sample analysis. The samples were analysed for the following parameters:

- Electrical Conductivity ($\mu\text{S}/\text{cm}$),
- Total Suspended Solids (mg/L),
- Salinity (Estimated TDS via calculation, mg/L),
- Turbidity (NTU),
- Total Hardness (Calcium Hardness & Magnesium Hardness, mg/L),
- Alkalinity (CaCO_3 , mg/L),
- Total Nitrogen (inc. NO_x & TKN) plus NO_2 , NO_3 , NH_3 ,
- Total Phosphorus and Reactive Phosphorus,
- Phenoxy Acid herbicides (μL), Glyphosate & AMPA (μL),
- Organo-chlorine (OC) and Organo-phosphorus (OP) pesticides ($\mu\text{g}/\text{L}$),
- Faecal Coliforms (MPN),
- total metal scan (ICP/MS) , and
- Mercury.

Water samples were collected from approximately 20 cm below the water surface in the appropriate bottles supplied by ALS and kept on ice in the dark.

3.3 Aquatic Habitat Description

The field team used standardised habitat assessment procedures to describe habitat characteristics at all turtle survey sites. The fieldsheets used included:

- State of the Rivers fieldsheets 3, 4 and 5

A copy of all completed State of the Rivers fieldsheets is presented in **Appendix A**.

Digital photographs were taken at a number of locations at each site to provide a broad overview and also to highlight the main habitats present.

Sites surveyed were also GPS located and marked in both latitude/longitude and eastings/northings in WGS 84 format.

4 Data Summaries

4.1 Sampling Effort

A comparison of sampling effort applied to each site is presented in Table 1. All *in situ* water quality was recorded on 7/10/08 except for Site 7 on 9/10/08. All analytical water samples were collected on 7/10/08. Dip netting was undertaken at Site 1 on 6/10/08 and seining on 8/10/08. Dip netting and seining was undertaken at Site 2 on 7/10/08, Site 3 on 8/10/08, Site 4 on 8/10/08, Site 5 on 9/10/08, Site 6 on 10/10/08 and Site 7 on 9/10/08.

Table 1 Comparison of sampling effort Pre-wet October 2008 turtle & water quality field survey

Site	Water Quality		Turtles	
	In situ	Analytical	Dip netting	Seine deployments
Site 1 Dawson River	✓	✓	✓ dusk	4
Site 2 Dawson River	✓	✓	✓ dusk	6
Site 3 Dawson River	✓	✓	✓ dawn	5
Site 4 Dawson River	✓	✓	✓ dusk	5
Site 5 Dawson River	✓	✓	✓ dusk	4
Site 6 Dawson River	✓	✓	✓ dawn	-
Site 7 Dawson River	✓	-	✓ dawn	4
Site 13 Bentley Creek	✓	✓	-	-

4.2 Turtles

No turtles were captured by dip netting or seining during the Pre-wet field survey in October 2008.

Turtles were observed at Site 3 (3 turtles), Site 4 (2 turtles) and Site 5 (1 turtle). Identification was unable to be carried out as only the heads were seen from a distance in the turbid water.

4.3 *In situ* Water Quality

Table 2 presents the *in situ* water quality data for the Pre-wet October 2008 turtle and water quality survey. Water temperature ranged between 21.60°C and 29.10°C at the sites surveyed. Records for pH ranged from 6.95 at Site 6 to 7.31 at Site 13. EC results ranged from 228.1µS/cm at Site 4 to 400.0µS/cm at Site 2. The lowest DO (mg/L & %) was 3.75mg/L & 46.1% recorded at Site 1 and the highest 7.14mg/L & 85.6% at Site 4. Turbidity ranged from 39.0NTU at Site 7 to 147NTU at Site 4.

Table 2 *In situ* Water Quality Pre-wet October 2008 turtle & water quality field survey

Site	Temperature (°C)	pH	EC (µS/cm)	DO (mg/L)	DO (%)	Turbidity (NTU)
Site 1 Dawson River	24.50	7.11	387.5	3.75	46.1	58.6
Site 2 Dawson River	24.29	7.15	400.0	4.97	60.6	91.4
Site 3 Dawson River	26.14	7.28	258.4	5.32	67.7	96.7
Site 4 Dawson River	23.49	7.24	228.1	7.14	85.6	147
Site 5 Dawson River	22.24	7.03	286.1	5.06	59.7	51.5
Site 6 Dawson River	21.60	6.95	230.0	6.14	71.2	124
Site 7 Dawson River	22.87	7.20	291.1	6.65	78.5	39.0
Site 13 Bentley Creek	29.10	7.31	267.5	4.81	64.1	101

4.4 Laboratory Analysed Measurements

The raw laboratory analysed water quality data for the 7 sites sampled is presented in **Appendix B**. Turbidity, Aluminium, Total Nitrogen as N and Total Phosphorus as P were generally present at high levels or concentrations across all sites.

4.5 Aquatic Habitat Description

Aquatic habitat as assessed by State of the Rivers fieldsheets 3 – 5 was comparable to the Post-wet survey undertaken by Ecowise in June 2008 (Ecowise 2008), with slightly altered water levels the obvious difference.

5 Survey Quality Assurance

The Hydrolab MS5 water quality meter was calibrated in the laboratory in accordance with Ecowise quality systems requirements and the manufacturer's specifications prior to deployment in the field. Calibration standards were also carried with the field team to conduct spot checks on the unit throughout the course of the field program to ensure accuracy and reliability of the results.

6 References

Cogger, 2000, *Reptiles and Amphibians of Australia- Sixth edition*, Reed New Holland.

Ecowise, 2008, *Post-wet Season Field Survey: Aquatic Flora and Fauna Component*.

Limpus, C.J., Limpus, D.J., Parmenter, J.C., Hodge, J., Forrest, M.J., and McLachlan, J., 2007, *An assessment of the Potential Implications and Mitigation Measures for Fitzroy Turtles (Elseya albagula and Rheodytes leukops)*, The State of Queensland (Department of Natural Resources and Water).

Appendix A – State of the Rivers fieldsheets - complete

Appendix B – Laboratory Analysed Results from ALS