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ABN 41 687 119 230

This document was created in response to a Freedom of Information request made to CSIRO.

FOI Number: FOI2021/16

Date: 12 March 2021

Request: Correspondence any time during September 2020 to end February 2021 between representatives of GISERA/CSIRO and with representatives of APPEA, Santos and/or Origin Energy regarding the report:

- Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin, Northern Territory, (GISERA project number: W18. December 2020)

Document(s): 6-17

For more information, please refer to CSIRO's FOI disclosure log at www.csiro.au/FOILog

s22

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Tuesday, 8 December 2020 5:05 PM
To: s22
Cc: Cunningham, Paul (CorpAffairs, Dutton Park)
Subject: FW: CSIRO's GISERA NT project - final report - stygofauna and microbial assemblages of the Beetaloo Sub-basin, NT
Attachments: Duplicate Attachment - Removed

Hi s22

I hope that you are well.

It is part of CSIRO's GISERA Communication Protocol to forward the National Research Management Committee a courtesy copy of final reports 10 working days prior to public release. This action does not constitute a form of 'review' by our industry partners but allows our partners to bring to our attention any concerns before the report is made public. We also conduct a knowledge transfer session with industry partners and government where the results are presented and discussed prior to public release (we've already communicated about our upcoming KTS).

The NRMC have just been emailed a copy of the final report for the NT project Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin, NT.

I am forwarding this to you as the assigned delegate for Origin's NRMC representative – Stephanie Stonier.

If you have any questions, please don't hesitate to contact us.

Regards
Jizelle

Jizelle Khoury
Executive Officer, CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA)
Energy | CSIRO
s22
Address: PO Box 52, North Ryde NSW 1670, Australia

CSIRO Australia's National Science Agency | csiro.au

Duplicate Email - Removed

Document 7

s22

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Tuesday, 8 December 2020 5:11 PM
To: s22 @shell.com
Cc: Cunningham, Paul (CorpAffairs, Dutton Park)
Subject: FW: CSIRO's GISERA NT project final report stygofauna and microbial assemblages of the Beetaloo Sub-basin, NT
Attachments: Duplicate Attachment - Removed

Hi s22

I hope that you are well.

It is part of CSIRO's GISERA Communication Protocol to forward the National Research Management Committee (NRMC) a courtesy copy of final reports 10 working days prior to public release. This action does not constitute a form of 'review' by our industry partners but allows our partners to bring to our attention any concerns before the report is made public.

The NRMC (including Patrick McKelvey) have just been emailed a copy of the final report for the NT project Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin, NT.

I am forwarding a copy to you also, as I was unsure whether you have officially taken over as Shell/QGC's representative on GISERA's NRMC. If this is the case, it would be great if you could let me know and I'll update our NRMC distribution list.

If you have any questions, please don't hesitate to contact us.

Regards
Jizelle

Jizelle Khoury
Executive Officer, CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA)
Energy | CSIRO
s22
Address: PO Box 52, North Ryde NSW 1670, Australia

CSIRO Australia's National Science Agency | csiro.au

Duplicate Email - Removed

s22

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Thursday, 10 December 2020 3:58 PM
To: s22
Cc: Cunningham, Paul (CorpAffairs, Dutton Park)
Subject: RE: FOR ADVICE: Origin attendees at CSIRO's GISERA knowledge transfer session NT water project

Hi s22

I am writing to let you know that we have decided to defer the knowledge transfer session to early 2021.

By deferring it, we'll be able to conduct a joint session with the other water project (Environmental monitoring and microbial degradation of onshore shale gas activity chemicals and fluids) which is due to finish shortly.

I'll be in touch in the New Year to confirm a date.

In the meantime, I'd like to wish you all the best for the festive season.

Kind regards
Jizelle

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Tuesday, 8 December 2020 7:40 AM
To: s22 @origin.com.au>; s22 @origin.com.au>
Cc: Cunningham, Paul (CorpAffairs, Dutton Park) s22
Subject: RE: FOR ADVICE: Origin attendees at CSIRO's GISERA knowledge transfer session NT water project

Hi s22

I wanted to let you know that we have earmarked Monday, 14 December at 9.30 10.30 NT time (10-11 am QLD) for the knowledge transfer session.

I haven't sent out a calendar invite yet as I'm waiting for the NTG to finalise their participant list. It will go out by Thursday (latest). In the meantime, can I ask that you please hold this timeslot in your diaries.

Many thanks
Jizelle

Jizelle Khoury
Executive Officer, CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA)
Energy | CSIRO
s22
Address: PO Box 52, North Ryde NSW 1670, Australia

From s22 @origin.com.au>
Sent: Wednesday, 2 December 2020 1:21 PM
To: Khoury, Jizelle (Energy, North Ryde) s22 s22 @origin.com.au>; s22 @origin.com.au>
Cc: Cunningham, Paul (CorpAffairs, Dutton Park) s22
Subject: RE: FOR ADVICE: Origin attendees at CSIRO's GISERA knowledge transfer session - NT water project

Hi Jizelle,

I remember you from when I was working with Shell; I hope you're well.

At this stage we are planning for Matt and Carl Altmann (copied in) to join the session in w/c 14 December.

Kind regards,

s22

Origin
Level 28, 180 Ann Street, Brisbane QLD 4000
s22

Connect with us

originenergy.com.au

Duplicate Email - Removed

s22

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Thursday, 10 December 2020 3:59 PM
To: s22
Cc: Cunningham, Paul (CorpAffairs, Dutton Park)
Subject: RE: FOR ADVICE: Santos attendees at CSIRO's GISERA knowledge transfer session NT water project

Hi s22

I am writing to let you know that we have decided to defer the knowledge transfer session to early 2021.

By deferring it, we'll be able to conduct a joint session with the other water project (Environmental monitoring and microbial degradation of onshore shale gas activity chemicals and fluids) which is due to finish shortly.

I'll be in touch in the New Year to confirm a date.

In the meantime, I'd like to wish you all the best for the festive season.

Kind regards
Jizelle

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Tuesday, 8 December 2020 7:39 AM
To: s22 @santos.com>; s22 @santos.com>; s22 s22 @santos.com>
Cc: Cunningham, Paul (CorpAffairs, Dutton Park) s22
Subject: RE: FOR ADVICE: Santos attendees at CSIRO's GISERA knowledge transfer session NT water project

Hi s22

I wanted to let you know that we have earmarked Monday, 14 December at 9.30-10.30 NT time (10-11 am QLD) for the knowledge transfer session.

I haven't sent out a calendar invite yet as I'm waiting for the NTG to finalise their participant list. It will go out by Thursday (latest). In the meantime, can I ask that you please hold this timeslot in your diaries.

Many thanks
Jizelle

Jizelle Khoury
Executive Officer, CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA)
Energy | CSIRO
s22
Address: PO Box 52, North Ryde NSW 1670, Australia

From s22 @santos.com>
Sent: Wednesday, 2 December 2020 1:25 PM
To: Khoury, Jizelle (Energy, North Ryde) s22
Cc: Cunningham, Paul (CorpAffairs, Dutton Park) s22
s22 @santos.com>; s22 @santos.com>
Subject: RE: FOR ADVICE: Santos attendees at CSIRO's GISERA knowledge transfer session NT water project

Hi Jizelle,

Can you please invite David Gornall, Mitch Bird (both CC'ed into this email) and myself

Regards,

Santos

s22

Santos Limited 32 Turbot Street Brisbane QLD 4000

s22

santos.com

Duplicate Email - Removed

Document 10

s22

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Thursday, 28 January 2021 10:01 AM
To: s22
Cc: Cunningham, Paul (CorpAffairs, Dutton Park)
Subject: RE: FOR ADVICE: Origin attendees at CSIRO's GISERA knowledge transfer session NT water project

Hi s22

I hope that you are well.

We've decided to proceed with the KTS for the stygofauna project and not conduct a joint session with the other water project. The other project is still a few weeks away from delivery and I don't want to hold up the public release of the Stygofauna report.

I've just sent through a calendar invite for 11 February.

Regards
Jizelle

Duplicate Email - Removed

[redacted]

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Thursday, 28 January 2021 10:03 AM
To: [redacted]
Cc: Cunningham, Paul (CorpAffairs, Dutton Park)
Subject: RE: FOR ADVICE: Santos attendees at CSIRO's GISERA knowledge transfer session - NT water project

Hi [redacted]

I hope that you are well.

We've decided to proceed with the KTS for the stygofauna project and not conduct a joint session with the other water project. The other project is still a few weeks away from delivery and I don't want to hold up the public release of the Stygofauna report.

I've just sent through a calendar invite for 11 February.

Regards
Jizelle

[redacted]

s22

Subject: CSIRO's GISERA 'Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub Basin, NT' project Knowledge Transfer Session
Location: Via WebEx (see inside for dial in details)

Start: Thu 11/02/2021 10:45 AM
End: Thu 11/02/2021 11:45 AM
Show Time As: Tentative

Recurrence: (none)

Organizer: Khoury, Jizelle (Energy, North Ryde)

Dear all

Please join us for a Knowledge Transfer Session where we will be presenting the latest findings from CSIRO GISERA's Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub Basin, NT project.

Date: Thursday, 11 February 2021
Time: 9.15 10.15 am (Darwin time)
Agenda (NT time):

9.15 am Welcome
9.20 am Research presentation
9.50 am Discussion panel with questions from all participants welcome
10.15 am Finish

Method: The meeting will be hosted by WebEx, please see details below. If you are first time using WebEx please log in 5 minutes prior to the meeting to allow for the program to download.

For any participants unable to connect using the Desktop or Video Conference Room WebEx options, please dial-in using the audio number. I will forward a copy of the PPT slides prior to commencement so that you can follow the presentation.

Welcome to CSIRO Webex Conferencing featuring: audio, video and presentation capabilities. You can join this conference from:

Desktop or Mobile Devices

https://csiro.webex.com/csiro/j.php?MTID=m215e5eb9df9e01b438f2318557851ff7
Once connected to your meeting remember to start your audio and video

Video Conferencing (VC) Rooms

Use the remote control or touch panel and dial the number indicated below:

CSIRO VC Room	1652631473# (hash required)
External VC Room	1652631473@csiro.webex.com

Phones - AUDIO ONLY

Primary Australia	+61 2 6246 4433
Quick Dial	+61262464433,1652631473%23%23
Other Global Numbers	https://conferencing.csiro.au/Call-in.php

Meeting Number/Access Code	165 263 1473
Password (if prompted)	rKZgerYM932

First time joining a Webex meeting? Watch this short video to get started:
https://conferencing.csiro.au/videos/videos.php?tab=join
Need further help? Take a look at the link below for user guides, videos and FAQs:
https://conferencing.csiro.au/index.php?meeting_number=1652631473&site=csiro.webex.com

We look forwarding to sharing our research with you.

Regards
Jizelle

Jizelle Khoury
Executive Officer, CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA)
Energy | CSIRO
s22
Address: PO Box 52, North Ryde NSW 1670, Australia

CSIRO Australia's National Science Agency | csiro.au

s22

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Thursday, 11 February 2021 8:42 AM
To: Barrett, Damian (Energy, Black Mountain); Rees, Gavin (L&W, Albury); s22
Cunningham, Paul (CorpAffairs, Dutton Park); s22
Carl; s22
Huddlestone-Holmes, Cameron (Energy, Pullenvale)
Subject: CSIRO's GISERA knowledge transfer session Stygofauna project
Attachments: Stygofauna GISERA 11 Feb 2021.pdf

Dear all

You have been invited to participate in this morning's knowledge transfer session for GISERA project Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-Basin, NT.

The calendar invite includes the Webex details where you can dial in via video and view the presentation.

For those participants who are not able to connect to Webex, please simply call ph: 02 6246 4433, followed by meeting id/access code 165 263 1473#. This connects you to audio only. You will then need to open the attached PPT slides and the presenter will instruct you when to move to the next slide.

If you have any questions, please don't hesitate to contact me.

Thanks
Jizelle

Jizelle Khoury
Executive Officer, CSIRO's Gas Industry Social and Environmental Research Alliance (GISERA)
Energy | CSIRO
s22
Address: PO Box 52, North Ryde NSW 1670, Australia

CSIRO Australia's National Science Agency | csiro.au

GISERA
Gas Industry Social and Environmental Research Alliance

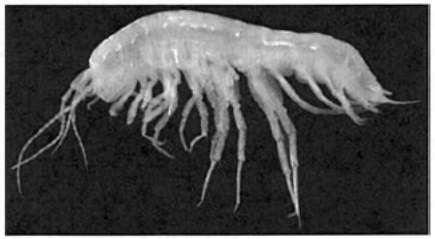
Characterisation of the stygofauna assemblages of the Beetaloo Sub-basin, Northern Territory

Gavin Rees, [redacted]
2nd Feb 2021

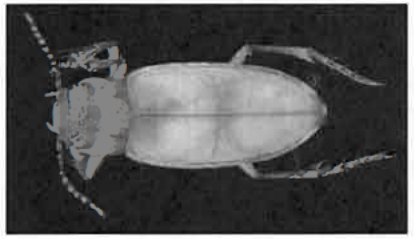
RIEL
Research Institute for the Environment and Livelihoods

Background

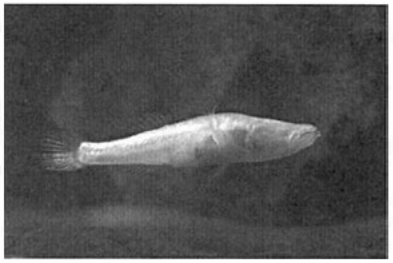
- Definition:
  - Ground water fauna, or stygofauna, are animals that live permanently underground in water.
  - Stygofauna live in a range of groundwater habitats—from tiny spaces between sand grains to pools and streams in caves.



Amphipod
(image courtesy Bennelongia)

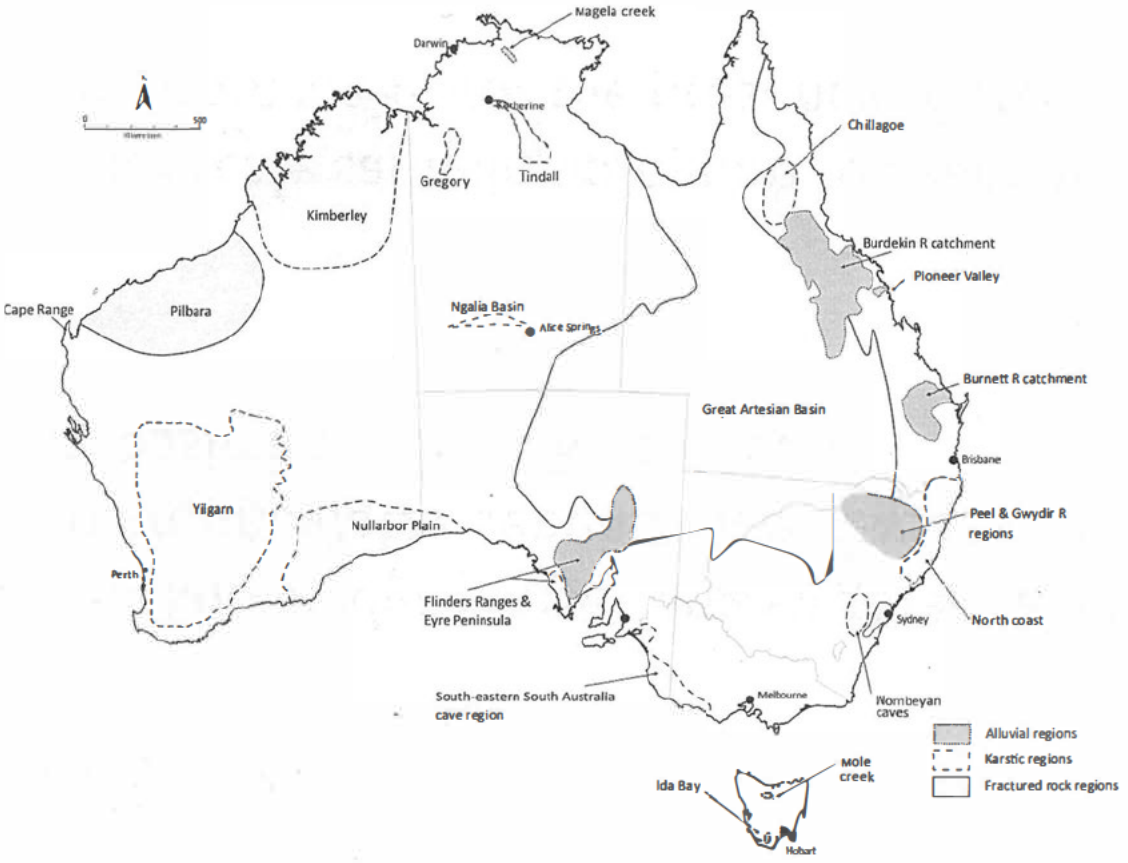


Beetle
(image courtesy Bennelongia)



Blind cave fish

Background - General aquifer types and regions where stygofauna have been found



Modified from Tomlinson and Boulton (2008) with additional information from Guzik *et al.* (2008), Hose *et al.* (2015a) and Chandler *et al.* (2017) and this study (the Tindall aquifer)

Pilot project

Overall project objective.

- To provide new knowledge concerning stygofauna and subterranean groundwater dependent ecosystems in the Beetaloo Sub-basin and Roper River system

Approach.

- Carry out a pilot scale sampling program to examine a limited series of bores/bore water for the presence of stygofauna

Project Team

Gavin Rees (CSIRO)

Daryl Nielsen (CSIRO)

s22 (CDU)

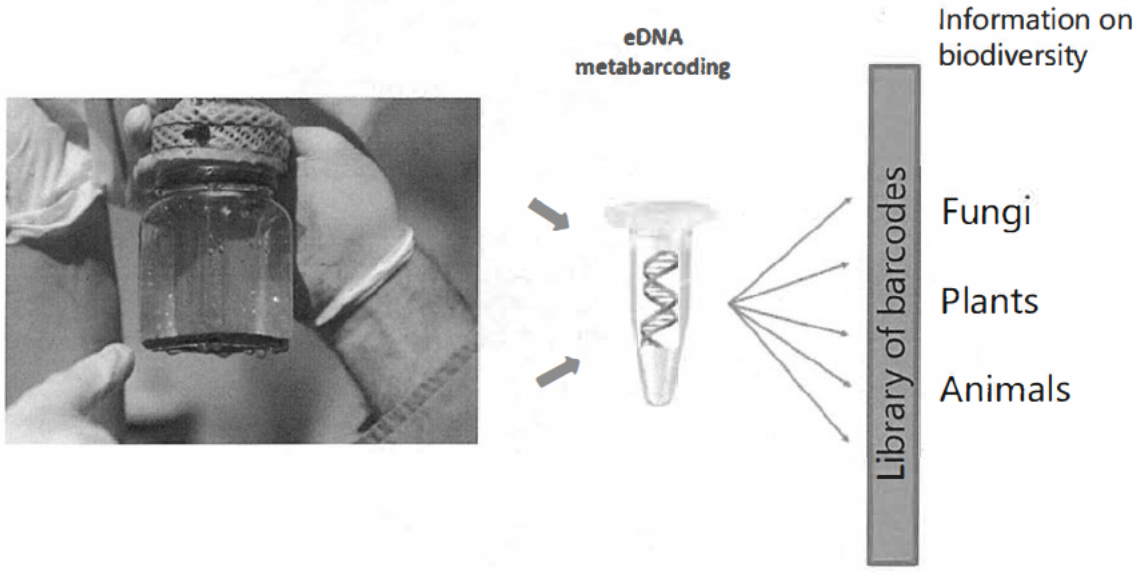
s22 (CDU)

Garth Watson (CSIRO)

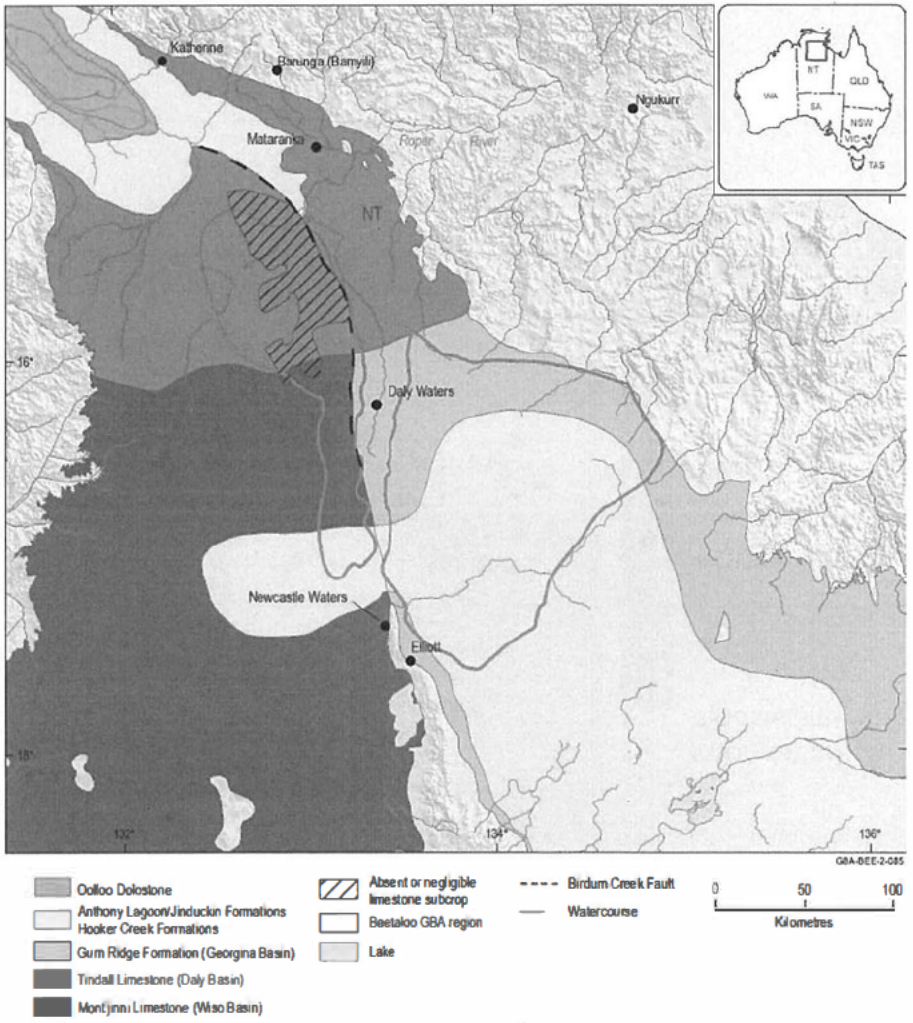
s22 (LaTrobe Uni)

Project – brief approach

- Sample bore water from:
  - 28 sites, including 2 springs,
  - From Mataranka to semi-arid Barkly Tablelands
  - Combination of sites within and outside leases, to sample different types bores
  - Carried out a second sampling trip. Further bores and revisited some earlier bores
- Use a range of bore sampling methods, depending on type of bore
- Preserve and identify any organisms
  - Where relevant, use DNA barcoding to identify organisms
- Use an environmental DNA approach to examine bore water
  - Detecting the DNA from organisms in bore water rather than entire organism


eDNA
metabarcoding
Information on
biodiversity
Library of barcodes
Fungi
Plants
Animals

Location


Katherine
Ranunga (Bamyili)
Ngukurr
Mataranka
Roper River
NT
Daly Waters
Newcastle Waters
Elliott
16°
18°
132°
134°
136°
GBA-BEE-2-085
NT
QLD
WA
SA
NSW
VIC
TAS
Oolloo Dolostone
Anthony Lagoon/Jinduckin Formations
Hooker Creek Formations
Gum Ridge Formation (Georgina Basin)
Tindall Limestone (Daly Basin)
Montjinni Limestone (Wiso Basin)
Absent or negligible limestone subcrop
Beetaloo GBA region
Lake
Birdum Creek Fault
Watercourse
0
50
100
Kilometres

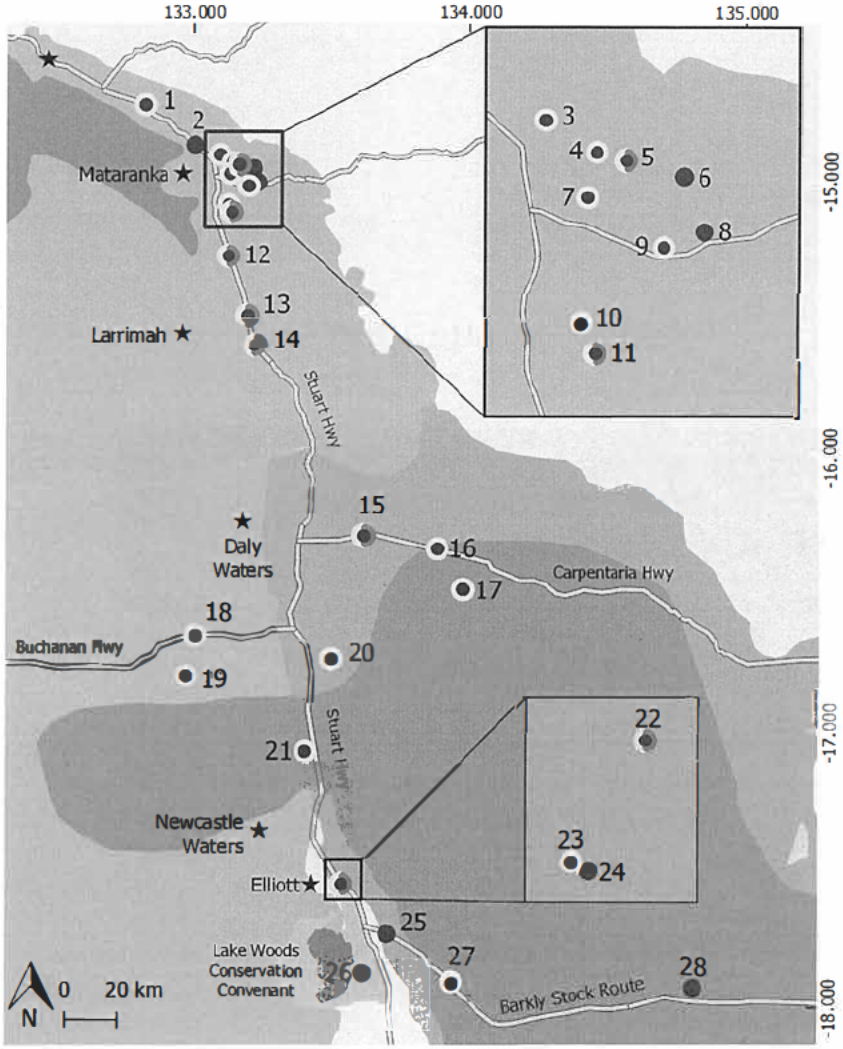
Legend

- Bores sampled in 2019
- Presence of stygofauna indicated by eDNA only
- Presence of stygofauna indicated by both collection of specimens and eDNA

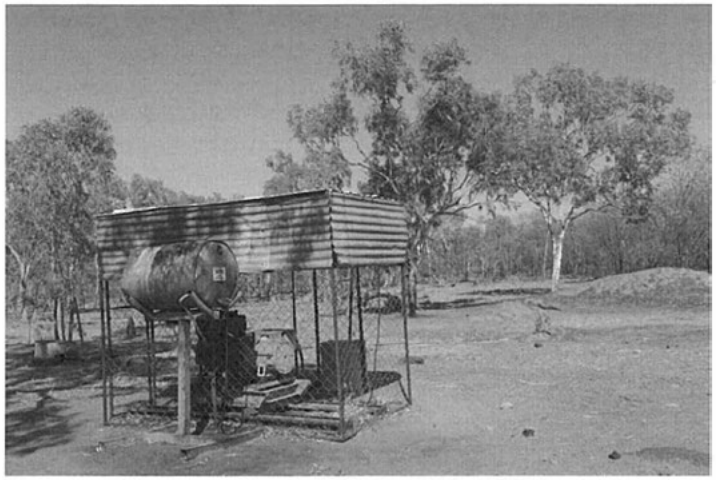
Major hydrostratigraphic units

- Oolloo Dolostone
- Tindall Limestone (Daly Basin)
- Gum Ridge Formation (Georgina Basin)
- Montijinni Limestone (Wiso Basin)
- Anthony Lagoon/ Jinduckin Formations

- ★ Main Towns
- Main Roads



Bores – some examples

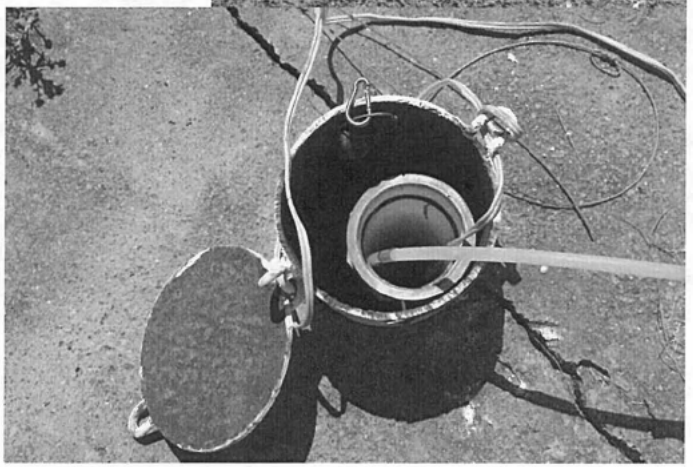


Buchanan Downs

Shenandoah homestead

Bores – some examples

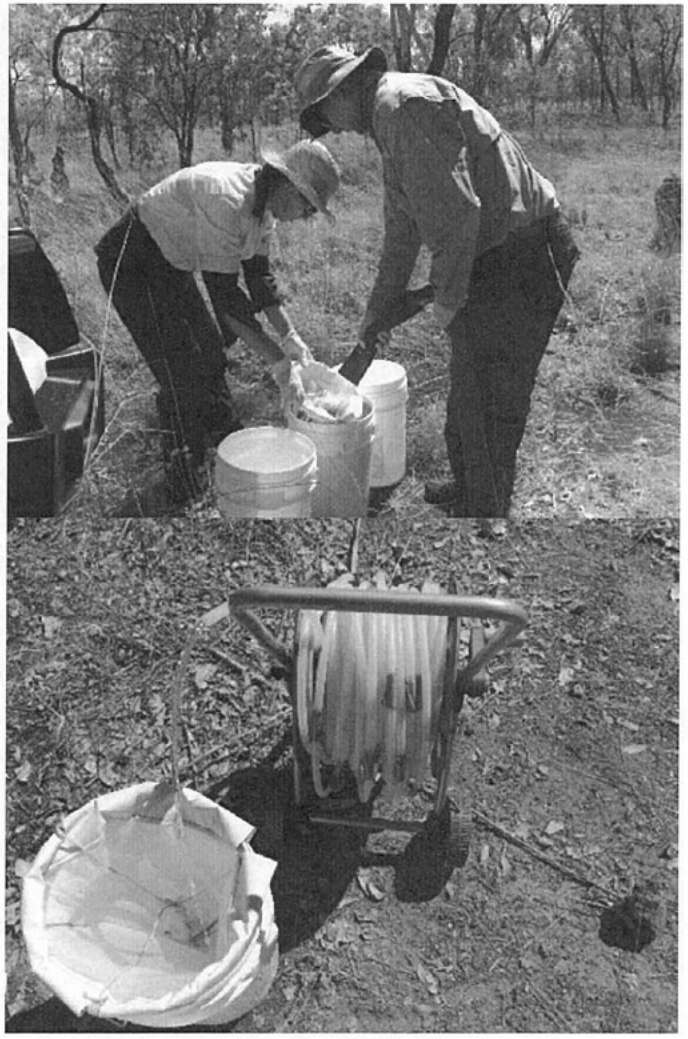
Elliot 8 (RN036781)



Mataranka Homestead (RN35796)

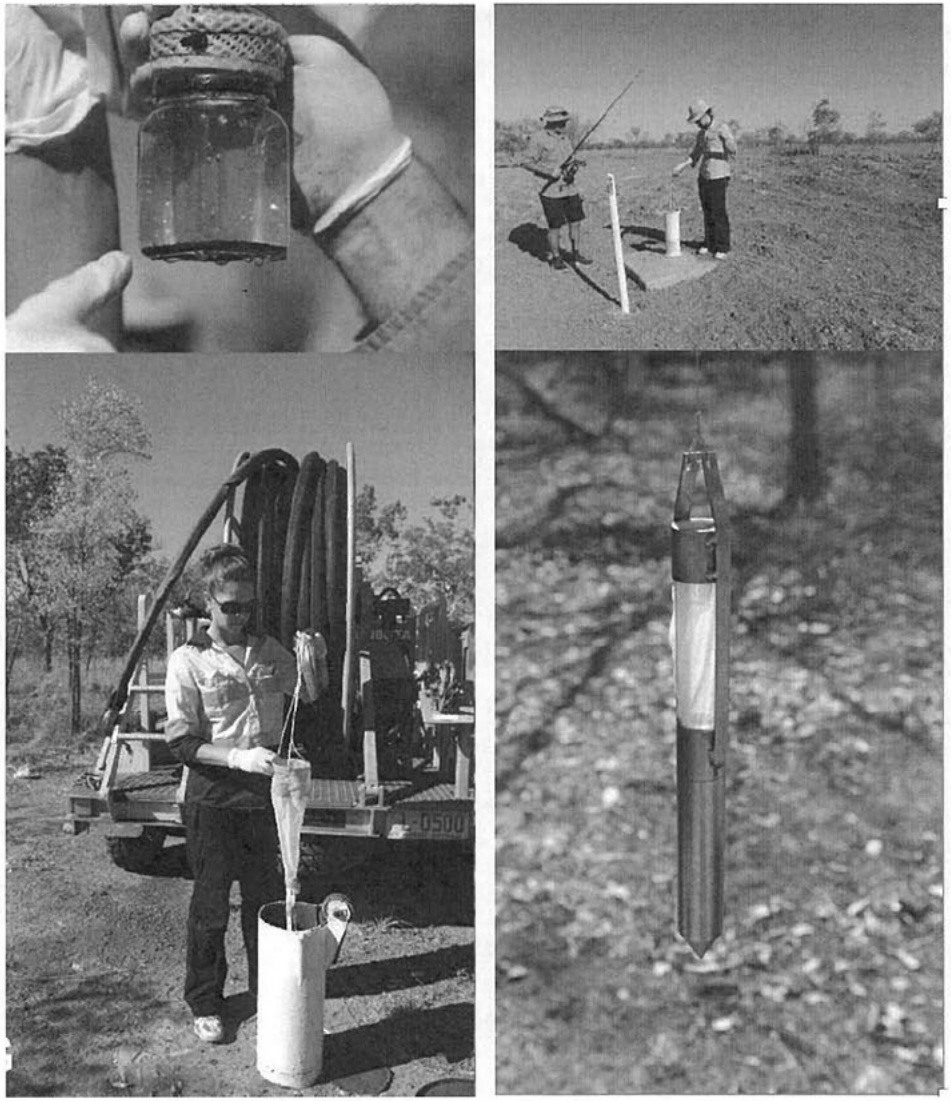
Bores – some examples

Bores – sampling using pumps



Pumped water is passed through an ultra-fine net to collect animals

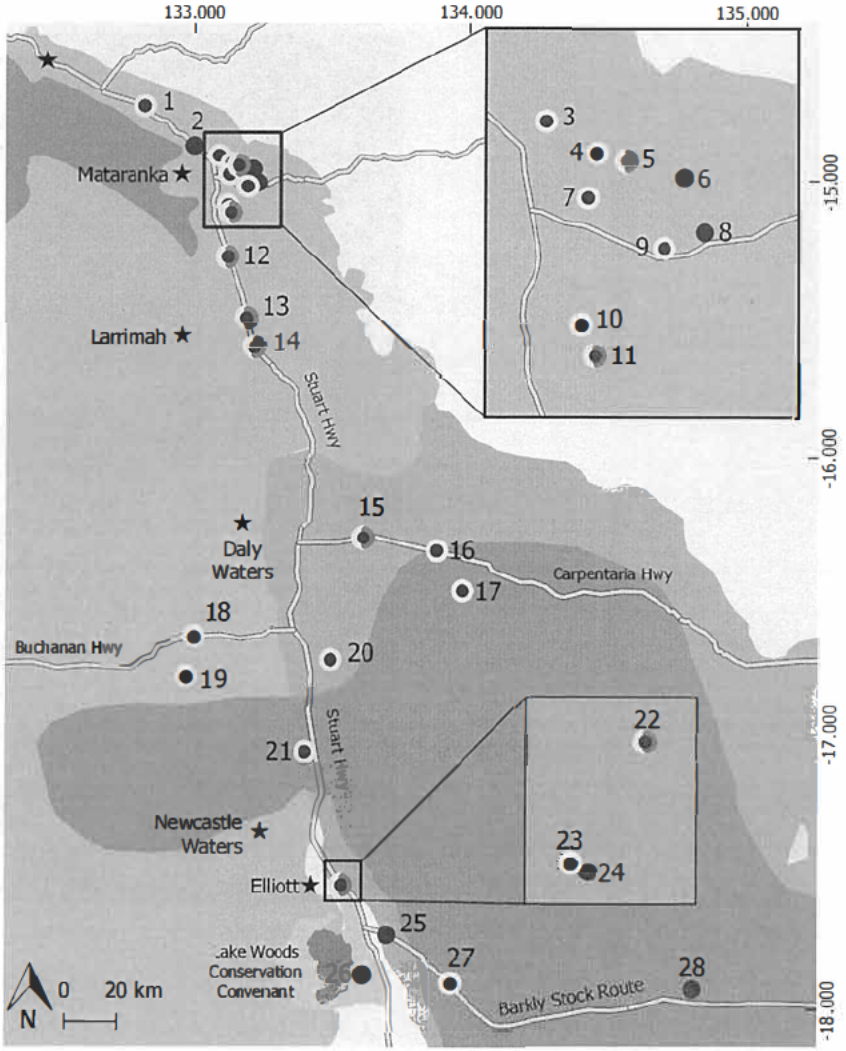
Bores – hand held nets



Results

Legend

- Bores sampled in 2019
- Presence of stygofauna indicated by eDNA only
- Presence of stygofauna indicated by both collection of specimens and eDNA

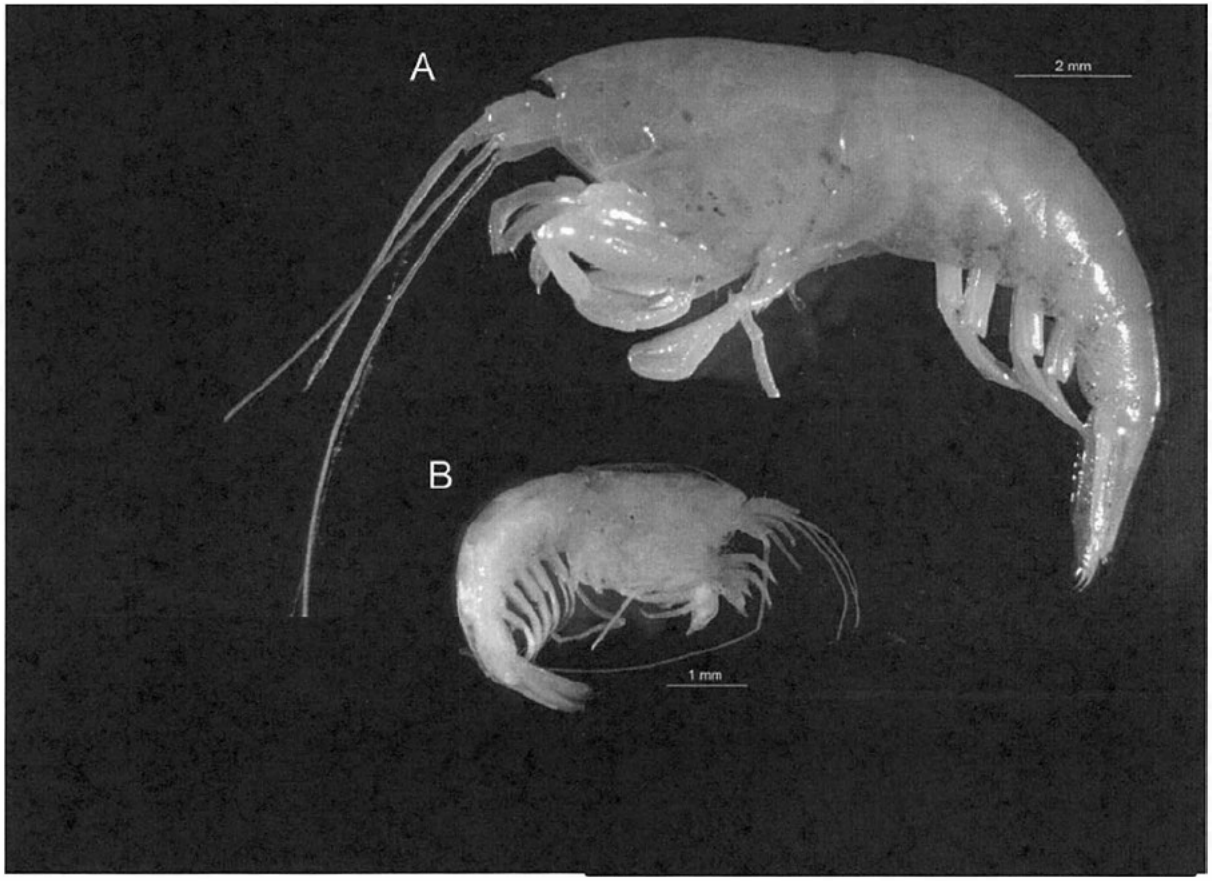


Major hydrostratigraphic units

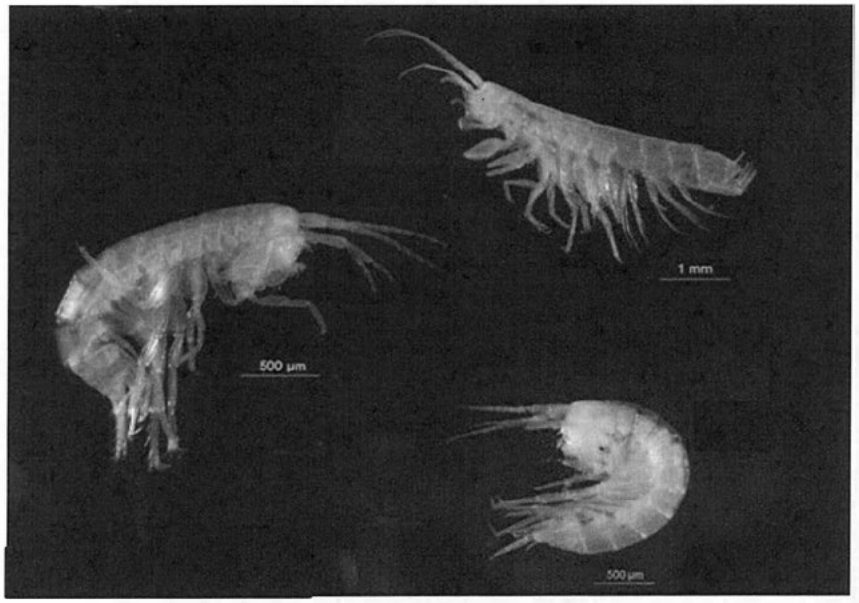
- Oolloo Dolostone
- Tindall Limestone (Daly Basin)
- Gum Ridge Formation (Georgina Basin)
- Montijinni Limestone (Wiso Basin)
- Anthony Lagoon/ Jinduckin Formations

- ★ Main Towns
- Main Roads

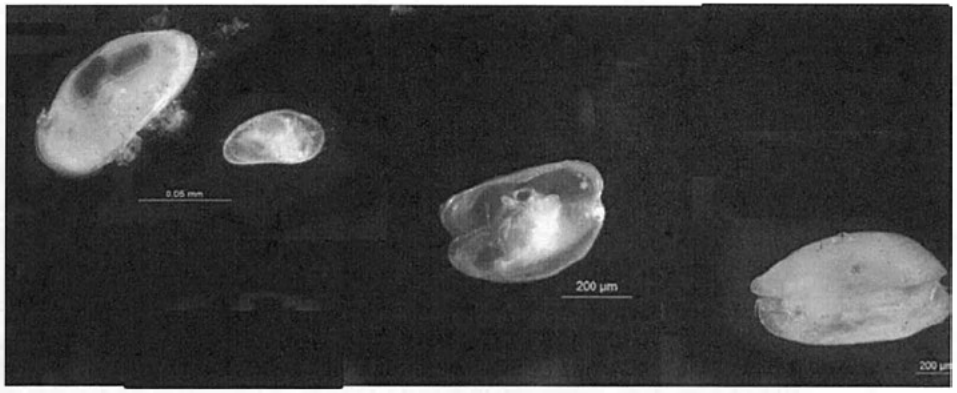
Blind shrimp



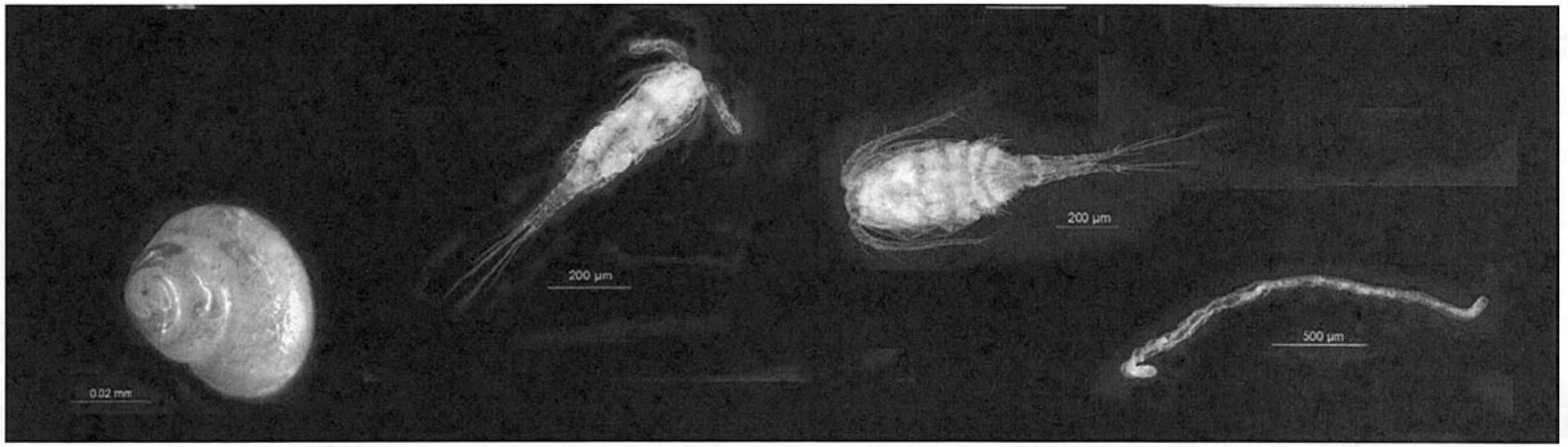
Small crustaceans



Amphipods
A very small crustacean



Ostracods –
Another class of small crustaceans



Snail

Cyclopoids
Tiny crustaceans
('zooplankton')

Worms

eDNA as a detection tool

- Our eDNA recognized three categories of organisms
  - Contaminant terrestrial DNA. Eg, ants
  - Probable soil organisms. Eg, soil fungi,
  - Organisms dwelling in bore waters. Eg, crustaceans detected by netting
- Stygofauna DNA detected across many bores
- Accurate identification of eDNA results requires
  - Animals accurately identified
  - DNA barcodes obtained and have been put into the DNA libraries

Results

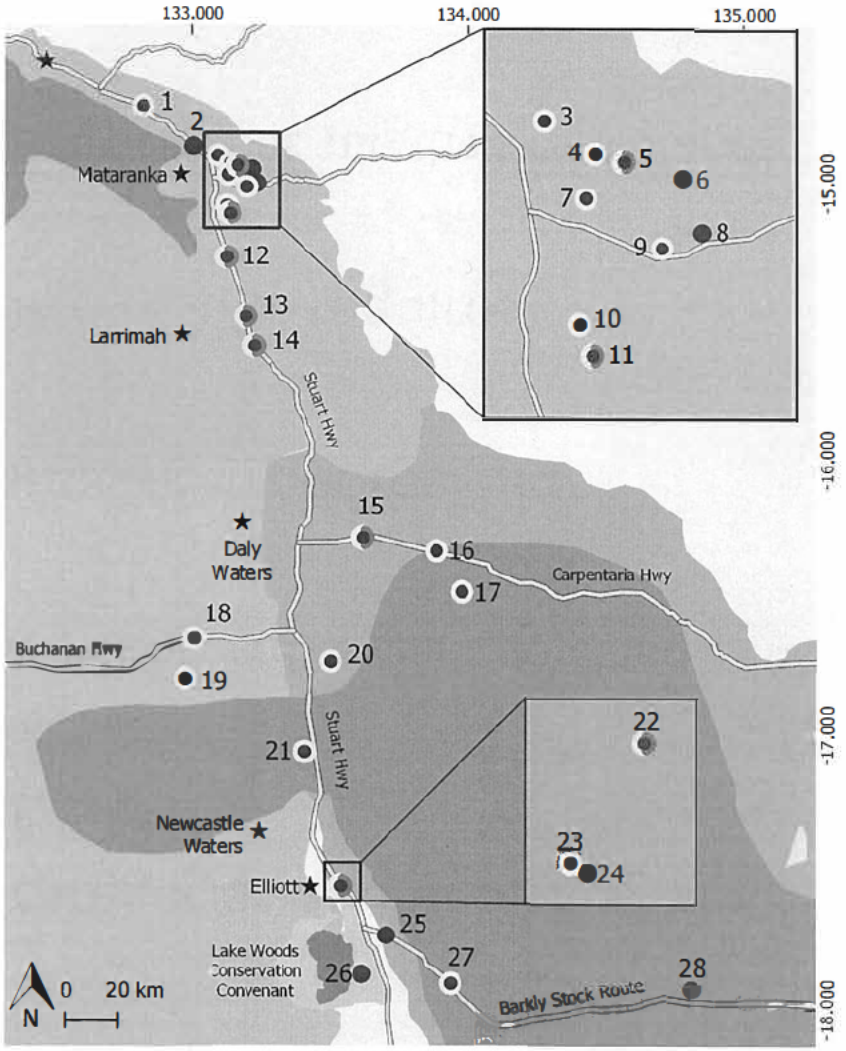
Legend

- Bores sampled in 2019
- Presence of stygofauna indicated by eDNA only
- Presence of stygofauna indicated by both collection of specimens and eDNA

Stygofauna dominated by crustaceans

Organised food web

- shrimp top predator?



Returning to the shrimp

- Three species been described from Cutta Cutta caves near Katherine
  - *Parisia unguis, Parisia gracilis, Pycnisia raptor*
  - Extremely limited taxonomy (single specimens, pieces of animal), so very low certainty about their true identity

- Our specimens most closely related to *Parisia unguis*
  - Given low genetic diversity of our specimens, this species spread over some 500km

Summary points

- First studies of the aquifers showed stygofaunal communities were dominated by crustaceans
- Showed little affinity with the stygofauna recorded from more extensively sampled Western Australian aquifers
- Highly likely new genera and species present in the Beetaloo Sub-basin
- Evidence of connectivity within the aquifer across our sample sites

Acknowledgements

- Stuart Halse (Bennelongia Environmental Consultants)
- John Short (BioAccess Australia)
- Vanessa Solano Rivera (CDU – for generating maps)

GISERA
Gas Industry Social and Environmental Research Alliance

Thank you

Gavin Rees
Principal Research Scientist
t s22
e [redacted]

CHARLES DARWIN UNIVERSITY

RIEL
Research Institute for the Environment and Livelihoods

CSIRO | Australia Pacific LNG | QGC | origin | Santos | NSW Government | Australian Government Department of Industry, Science, Energy and Resources | Supported by Government of South Australia | Queensland Government | Northern Territory Government | Pangaea Resources Pty Ltd

s22

From: Khoury, Jizelle (Energy, North Ryde)
Sent: Thursday, 11 February 2021 9:54 AM
To: s22
Subject: RE: CSIRO's GISERA knowledge transfer session - Stygofauna project

OK thanks for letting me know.

Regards
Jizelle

From s22 @santos.com>
Sent: Thursday, 11 February 2021 9:31 AM
To: Khoury, Jizelle (Energy, North Ryde s22
Subject: RE: CSIRO's GISERA knowledge transfer session - Stygofauna project

Hi Jizelle, just letting you know I might be 5-10 mins late to this. Dave and Mitch will be there

Regards,

Santos

s22

Santos Limited, 32 Turbot Street, Brisbane QLD 4000
s22

santos.com

Duplicate Email - Removed

[redacted]

From: [redacted]@santos.com>
Sent: Thursday, 11 February 2021 12:51 PM
To: Barrett, Damian (Energy, Black Mountain)
Cc: [redacted]
Subject: Stygo in Beetaloo

Damian
I think the discussion about the effect of a bore on stygo sampling error is somewhat of a red herring. Even if results are valid, contextualising findings will be difficult without a complete risk assessment, or at least some discussion of the possible pathways/mechnisms (what can we discount as a potential hazard e.g. aquifer water extraction), which is beyond the scope of this study.
Re: effect of bores on stygo sampling error this is bigger issue than the Beetaloo Basin, and may not be necessary for the SREBA. However it may be worth acknowledging the uncertainty this introduces, if nothing else but to stimulate the broader research community:

- My observation is that in dry parts of the world, the animals you will find eking out a living in and around a bore can be staggering. It is common to see piles of bones at the bottom of a bore when we run a camera. Pulling pumps out of holes, I've seen large numbers ~10cm frogs attached to a riser where there was no obvious way for them to get into the bore, unless when very small.
- I'm not saying that stygofauna do not exist, but how can stygofauna sampling methods and analysis correct for the effect of the bore on the local groundwater environment.
- Possible research angles, compare results:
    - How do water quality parameters offer insight for whether the water sampled was bore column or true aquifer water (noting the strict standard for groundwater sampling re: bore purge volumes)
    - Sampling standing water column method versus purged water methods
    - Age of bore (new (months) vs old (decades))
    - Bore condition (is the bore completely open to environment, part-sealed (small gaps), total seal (screw cap/bolted flange))
- eDNA offers a novel research angle using DNA residence times some DNA may only be reasonably explained by surface interaction due to the bore. Acting like a tracer.

Cheers

[redacted]

Santos

[redacted]
Santos Limited, 32 Turbot Street, Brisbane QLD 4000
[redacted]
santos.com

[redacted]

From: Cunningham, Paul (CorpAffairs, Dutton Park)
Sent: Tuesday, 16 February 2021 2:47 PM
To: [redacted]
Cc: Barrett, Damian (Energy, Black Mountain)
Subject: FW: stygofauna release out today

H [redacted]

The Conversation article was initiated by CDU researcher professor [redacted]

Our CSIRO researchers provided feedback to ensure as far as possible The Conversation article reflected the research.

Our own key messages remain tightly focussed on the substance of the final report, and our communications material was distributed nationally this morning at 6am.

Here's a link to the CSIRO/GISERA and Charles Darwin University joint media release and images

CSIRO/GISERA Fact sheet

CSIRO/GISERA Final report

CSIRO News

Happy to discuss further if you have any questions.

Paul Cunningham
Communication and Stakeholder Manager
Gas Industry Social and Environmental Research Alliance
Energy | CSIRO
[redacted]

s22

From: Cunningham, Paul (CorpAffairs, Dutton Park)
Sent: Wednesday, 17 February 2021 5:40 PM
To: s22 @chambernt.com.au; s22 @ntfarmers.org.au; James.Pratt s22 s22 @originenergy.com.au; Robinson, Cathy (L&W, Dutton Park); Chilcott, Chris (L&W, Darwin); s22 @nlc.org.au; s22 @santos.com; Dewhurst, David (Energy, Kensington WA); s22 @gmail.com; executive.office s22
Cc: Barrett, Damian (Energy, Black Mountain); Khoury, Jizelle (Energy, North Ryde)
Subject: FW: CSIRO GISERA final report online stygofauna and microbial assemblages of the Beetaloo Sub basin, NT

Dear all

The final report of the CSIRO GISERA project *Characterisation of the stygofauna and microbial assemblages of the Beetaloo Sub-basin, NT* is now online. This project is complete.

This report describes the results of a joint CSIRO GISERA /Charles Darwin University survey of 26 water bores and two groundwater springs in the Beetaloo Sub-basin and Roper River system in the Northern Territory. The survey revealed diverse communities of tiny aquatic animals (stygofauna) in the Cambrian Limestone Aquifer. This study provides the first description of stygofauna in an otherwise little-studied region of Australia and likely includes discovery of new species of crustaceans.

This research responds to recommendations from the Northern Territory Government's *Scientific Inquiry into Hydraulic Fracturing in Northern Territory*. This baseline data is essential for biodiversity conservation and the maintenance of the ecological integrity of high value groundwater dependent ecosystems in the region, and informs appropriate policy and management responses to shale gas development proposals.

Supporting resources: Joint CSIRO GISERA/Charles Darwin University media release and factsheet also available on the GISERA web site.

If you would like to discuss these result please contact GISERA Director Damian Barrett.

Paul Cunningham
Communication and Stakeholder Manager
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s22