



C.D.A.A. Newsletter

No. 147 - MARCH 2019

GUIDELINES

CAVE DIVERS ASSOCIATION OF AUSTRALIA

(Incorporated in South Australia)

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*Kilby's Sinkhole - main diver is Jake Manser
Photographed by Geoffrey Whitehorn*

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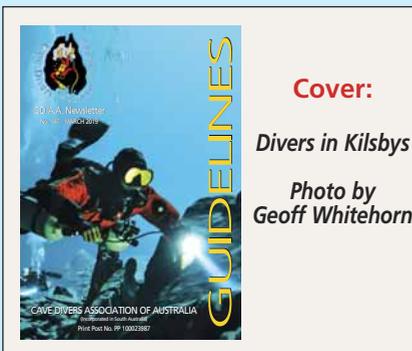
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CONTENTS

Editorial - Meggan Anderson	5
National Committee Updates	6-9
Site Access	28-29
Instructor List	30

Articles...

OzTek 2019 Review & Schedule	10-14
Tank Cave Mapping - Adrian Richards & Ken Smith	14-19
Diving into Sinkhole Gin - Megan Anderson	22-23
Cold Caves in Scandinavia - Oscar Svensson	24-27
Parting Shots - S. Paakkari	31



CAVE DIVERS ASSOCIATION OF AUSTRALIA

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GUIDELINES is a newsletter of the Cave Divers Association of Australia. All articles for the following issue are to be sent to the Publications Director, Email: publications@cavedivers.com.au

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Policy Type: Affinity Combined General & Products Liability Policy - LIU-CAS-AEAL-14-01
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Photo by Liz Rogers

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EDITORIAL MEGGAN ANDERSON



Welcome to another edition of Guidelines.

There have been a lot of newsworthy events happening over the last 9 months and with the speed of social media these days and the news being only a click away, by the time Guidelines rolls around it is old news. I'd like to therefore start off by giving a belated congratulations to Richard Harris and Craig Challen on their Australian of the Year achievements. I know a lot of members are very proud and I'm sure it has played a role in some people rejoining the association in recent months and getting back in to cave diving. I was a bit behind with reading all the press but for some time I had been toying with writing an abstract for a social work conference. I kept coming back to the word "resilience" in my brainstorming around the theme - because it is something I think about personally and professionally. A few days later my supervisor at work gave me a newspaper clipping, where Harry talks about resilience: "I do fear for kids today who, living in a risk averse society, will not learn to challenge themselves and to earn the grazed knees and stubbed toes that really are necessary to build resilience and confidence." Prior to the Thai Cave Rescue, most non-divers took zero interest in my hobby and this is one of many examples where non-divers are recognising this story and our sport as holding lessons you can apply in other contexts. I think it's also great that Harry and Craig are using their exposure to help others. A case in point is refugee footballer Hakeem al-Araibi, who was recently released from prison in Thailand, after being detained while on honeymoon. You can Google to learn more about his story but Harry and Craig joined in the campaign for him to be released by writing a letter to the Prime Minister of Thailand.

Another story that made the news, was the discovery of dinosaur bones in Tank Cave by Ryan Kaczowski, which our National Director writes more about in his report. While I must be honest and say I was never the kid that got into dinosaurs, I do recognise the significance of this discovery and how exciting it is. If anyone wishes to interview Ryan and write an article about it (I don't think I'd be able to write one to do the story justice) I would be over the moon. Adrian Richards and Ken Smith have written an awesome article for this issue about Tank Cave mapping, which provides some history around prior work that helped pave the way for this discovery.

Oztek is happening this month and many members are presenting including the news makers from the last few months. The CDAA will have a booth so please drop by and say hello. I will also be there for the first time and will endeavour to get as much material for June's Guidelines for those who are missing out. There is more information about the Oztek highlights in this edition and I think this year the spotlight will definitely be on cave divers. In terms of records, things are ticking along as usual and currently I am training a new Records Officer who should be up to speed once the busy renewal period starts.

I hope you all enjoy this issue and please consider putting fingers to keyboard and writing an article for Guidelines! If you need any ideas please get in touch with me.

Meg

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Articles for Guidelines June 2019 - Deadline is May 15th

- Send articles and jpeg images by email to guidelines@cavedivers.com.au

NATIONAL COMMITTEE UPDATE

MARCH 2019

Hope you all had a fantastic Christmas break. The last three months in CDAA-land have been very productive. Whilst it isn't all of a calibre to deserve an 'Australian of the Year' award (Congrats Craig & Harry!) it is great to see lots of hard work from last year beginning to come to fruition.

Towards the end of 2018 the committee met over several days and nights to review the CDAA Member Regulations and Diver Training Standards and bring them up to date. Updated versions of both documents are now available on the CDAA website in the member document library. Next on the agenda is the revision of the CDAA Emergency Response protocols.

In January I travelled to Mt Gambier to meet up with palaeontologist and palaeoecologist, Dr Julien Louys, to discuss Ryan K's significant discovery of a cache of previously undisturbed fossils in Tank Cave. Dr Louys, also a CDAA member, is in the process of preparing a linkage-grant application, in collaboration with the CDAA, with aims to support a 3-year research effort, to not only study this particular deposit, but other deposits found in the caves and sinkholes in the region.

Other objectives of the project will be to develop well-defined methods for researching and excavating fossils found in fresh-water sites, as well establishing general guidelines so cave divers know exactly what to do should they make a similar discovery. If the linkage-grant application is successful, CDAA members will have the opportunity to play a very active role in the associated research efforts, so if this is something that would interest you, stay tuned.

To protect the fossils from unnecessary disturbance in the meantime, we'd like to remind members that access to the 'control zone' West of G16 is restricted to members who successfully apply for a Science, Mapping and Research (SMR) Permit to conduct preliminary research works. Thank you to the members who have already assisted with the photographing and surveying of this area to date.

An updated version of the Tank Cave map has now been printed and laminated and will be installed in the Tank Cave shed during the first weekend in March. In line with this, the Fossil extension, C extension and D tunnel have had new line markers installed and are in the process of being "pinged". A "Stop" sign has also been installed at the restriction in Fossil Cave. Thank you to all the members who have helped make this happen.

Late last year, members received an update from DEW regarding changes to the booking protocols at a number of sites, including Fossil Cave and Goulden's Sinkhole. There have also been changes to the fee structures to dive these and other DEW-managed sites, particularly for commercial operators (including CDAA instructors). Both instructors and general members have contacted us with concerns about these changes. The National Committee has been working diligently to address these concerns and has recently submitted a proposal to lease some of these sites directly, which we feel is one solution that could benefit all parties involved.

Lastly, I'd just like to give a HUGE thanks to my fellow committee members. It is a tremendous honour to work alongside a group of passionate people that invest so much time and effort and have nothing but the CDAA's best interests at heart. I'm looking forward to seeing what great things we can achieve together in 2019!

Warm Regards, Pete
CDAA National Director



On behalf of the National Committee



Mary-Anne Mcleod,
Business Director



Kelvyn Ball,
Site Director



Joseph Monks,
Standards Director



Meggan Anderson,
Publications and
Records Director

SITE REPORT KELVYN BALL



Trust everyone has enjoyed their summer diving this year. Have had great weather for it. It was great to see some divers even breaking in the New Year diving at Kilsby's.

Big congratulations go out to Craig and Harry on their Australian of the Year Award. Truly was an amazing feat that they have achieved helping rescue the Thai boys.

Tank Cave has finally been set up for monthly mowing while supporting the local Bedford Group. Give them a big Hello if you see them out there. It's a group supporting people with disabilities.

The driveway should be under repair in the next couple of months too. Peter Wolf is installing a new white board soon and Steve Coulter has installed line markers in C Extension. Thanks guys!

Engelbrechts East Cave has had bricks realigned for easier gearing up without disturbing the silt and the old lighting has been replaced. Thank you to the help of Pat, Otto and Victoria! Many hands make quick work.

Is everybody aware of the new booking system with DEWNR? Let us know of any issues as it is a work in progress.

Divers please note: Kilsby's bookings are now a 2 HOUR TIME SLOT due to recent changes by the owner. Mid-week bookings can be made on a Tuesday or Thursday.

I would like to send out a big cheers to all the Site Access Officers and all other volunteers that help out with the running and maintenance of our

amazing sites. It would be impossible to access the sites we have without these people doing many hours behind the scenes. Truly appreciate your dedication.

Cheers until the next one!

Kelvyn Ball, CDAA Site Director.

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You can opt for an electronic copy of Guidelines rather than a paper copy. Simply login to your CDAA online account, select the dropdown menu under the My Records tab and click on Update My Details. Handy for those who have multiple CDAA members in their household or for those wanting to do their bit for the environment!



Hello All,
It has been an interesting few months and I can certainly say that the time has flown by, it has been interesting to say the least and behind the scenes it has been go go go. Let me begin by first of all thanking the current National Committee, Members and Instructors for all the support and assistance I have received while adjusting to the Standards Director role. I genuinely admire and respect the amount of work/time the directors put in to ensure that the CDAA runs as smoothly as it does.

The National Committee has been meeting over the last few months, an important goal has been to examine and update the Regulations and Diver Training Standards. It has been great to have the directors come together to discuss the future direction of the CDAA.

Many people will be aware that the instructor body met with the previous Standards Director last year to discuss important issues surrounding the Diver Training Standards and present new ideas; I was fortunate to have attended this meeting myself. It has taken some time to get stuck in to the Diver Training Standards, but it finally came together following the consultation with the instructor body to update and change some key points.

I am happy to say that we have achieved the goal of updating the documents and there are

other agenda items that have been earmarked for future investigation. It is still early days but we have received positive feedback regarding the updates and a number of courses have already been conducted successfully. There may be some issues that arise but we as an organisation will come together to make it work and continue evolving.

I had the pleasure of meeting up with some instructors in Mount Gambier recently, it was great to see the new students being taught by some of the best the CDAA has to offer. I look forward to seeing their progress within the association; the feedback from the students has been second to none.

The next upcoming event for the National Committee is OZTek- we will be there in force to represent you the Association, fielding questions and promoting interest; as we are all aware it has been a massive year for cave divers.

I will finish this off by giving a huge congratulations to Craig and Harry for the privilege of being Australians of the Year. You have both represented the sport like true gentlemen and people have been made aware of the huge commitment you both have made not just to the rescue, but also here in Australia with education on training and rescue; I am sure you will have very sore hands following OZTek.

Peace Out and dive safe within the standards.



Having recently been appointed Business Director, I have been focusing on understanding the processes, negotiating red tape, and diving into the Financials to give visibility to the National Committee of the year to date results and developing a full year forecast. Thank you very much to Deb Williams and Mathew Rochford for their support during the transition. I will be continuing to focus on the Financials and begin working with the National Committee on developing the Strategic Plan.

On a more exciting note, preparations for the upcoming Oztek in March (16-17th) are well underway. If you are heading along, please come and visit the Directors at the CDAA stand and encourage any of your diving mates who might be interested in cave diving to come chat also. We will be opposite John Dalla-Zuanna and Wayne Johnson's VR Cave experience! It's a great conference, I look forward to catching up with our CDAA members up there and hopefully meeting more.

Plans for the AGM and Symposium are coming together. It will be held in Mount Gambier on Saturday, October 26. Speakers are starting to be locked in, but there is room for more ideas – what would you like to see? If you have any suggestions, please get in contact. Of course, everyone loves a good door prize, so any businesses who wanting to support the day I would be keen to hear from you.

Mary-Anne McLeod #5011
Business Director

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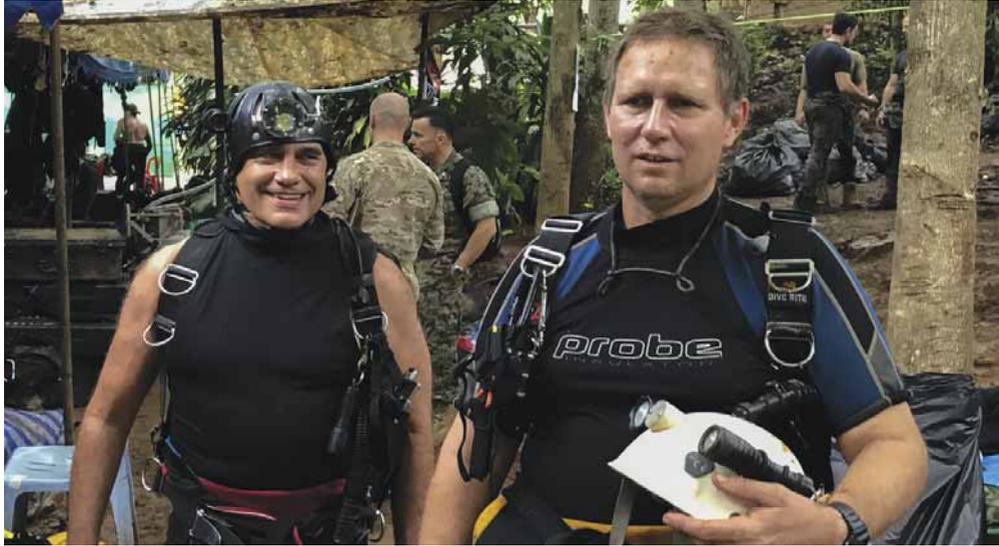
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Australia is punching above its weight again at OZTek2019 Advanced Diving Conference. OZTek has something for everyone, no matter your certification. Here are a couple of highlights:

Thai Cave Rescue Special

Our Australians' of the Year, Richard Harris and Craig Challen will be holding a special presentation on the Tham Luang Thailand Cave Rescue, an incredible rescue requiring the special expertise of a few and the collaboration of thousands. Uncover all the details, the highs, lows, logistics, and challenges which had to be overcome to enable the boys and their coach to be extracted successfully.

HMS Royal Oak - 80 Years Underwater

Another World First presentation will be given by Emily Turton. Dive boat skipper, technical diver and lecturer in Maritime Studies, and expedition leader, Emily will be bringing us previously unseen images and videos of the HMS Royal Oak. This famous protected war grave is being surveyed early in 2019 and the reports will be hot off



Photo Crown Copyright,
Multibeam image of HMS Royal Oak
images by Marjo Tynkkynen, Kieran Hatton,
Professor Chris Rowland

the press. Emily will talk about the ship, her loss of 834 crew, and take us on a tour with never-before seen digital imagery. It's a must-see event.

DON'T MISS OUT – we have single speaker tickets available, half day passes as well as the Show Only tickets. If you never go, you'll never know!

Meet all our presenters here
<http://oztek.com.au/The-Speakers>

See the entire Speaker Schedule over the next few pages in Guidelines.

Tickets on sale now – www.OZTek.com.au

Tank Cave 'VR' Experience

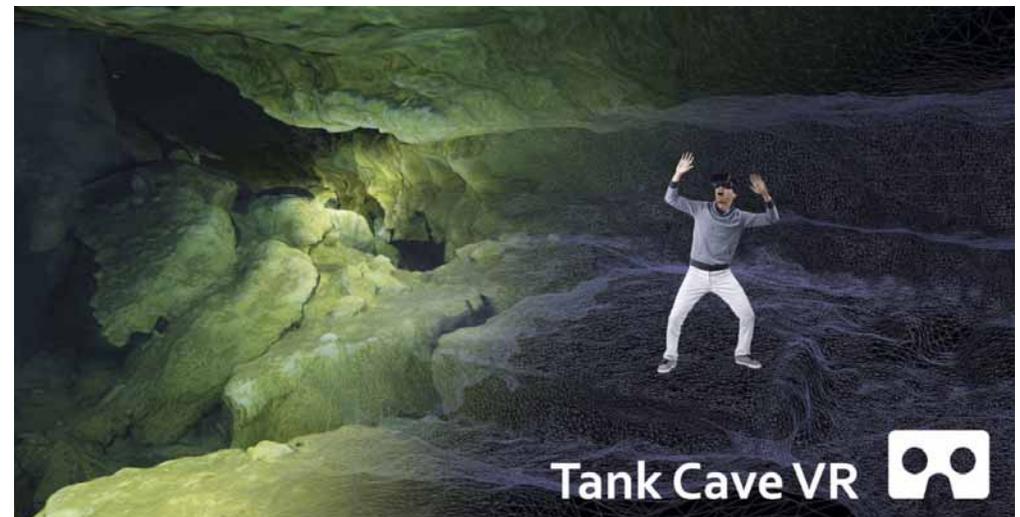
At OZTek2019, for the first time, come and dive a piece of Mount Gambier's Tank Cave – virtually... John Dalla-Zuanna & Wayne Johnson have reconstructed a dive into Tank Cave, and you can don a headset and dive there too!

The Cave 'immersion' will take approximately 3 – 5 minutes, take a look around, experience the 'space' in 3D and see the incredible cave features as if you were there. Technically a first, this is one cave dive you don't need to watch from the side lines.

With caving diving making the news world over, first with the Thai Cave Rescue and, more recently, Australian caver & OZTek speaker, Ryan Kaczowski, discovering the globally significant collection of ancient bones in Tank Cave, Mount Gambier SA – John Dalla-Zuanna and Wayne Johnson, long time members of the notorious Wetmules and regular cave divers, felt it was time everyone experienced cave diving at least once... and so, they created the Tank Cave VR Experience.

The Cave 'immersion' will take approximately 3 – 5 minutes – fly through a section of Tank Cave, looking up, down and around. Experience the 'space' in 3D, you'll get to move around, walk up and down the 'corridor' and get to see all the incredible cave features.

The Tank Cave VR will be open all weekend at OZTek2019 Advanced Dive, Travel, Training & Photography Show at Hall 5, International Exhibition Centre, Darling Harbour, Sydney.



OzTek 2019 Schedule & Sponsors:



SATURDAY 16th MARCH 2019 (continued)

10:15 - 11:00am	Hypoxia: Insights to a silent killer - Drs Simon Mitchell & Nick Gant	Photography and techniques from the Twilight zone - Michael AW	Project Baseline - Todd Kincaid	Essential Basics in Underwater Photography - Pete Mesley	Atlantis Resorts Philippines - Roni Ben-Ahron
Break	30 mins				
11:30 - 12:15pm	Diving Canadian Arctic: The North West Passage - Nathalie Lasselin	A Matter of Closure - Dr James Hunter	Breathhold Hazards - The Known & Unknown - Dr Neal Pollock	Mastering The Edit Suite - Peter Lightowler	rEvo - The new Horizon - Paul Raymaekers
Break	30 mins				
12:45 - 13:15pm	Rebreather Bail out - do you carry enough? - Paul Toomer	Battle of Sydney Harbour - Matt Carter	Freediving with Nature - Amber Bourke	Discovering & capturing History - Julia Summerling	Nikon's School Schedule - Chris Dalton
Break	30 mins				
13:45 - 14:30pm	WWII Aircraft lost at Sea - Profs Chris Rowland & Kari Hyttinen	Is there too much safety in Tech diving? - Gareth Lock	Patent Foramen Ovale (PFO) in Divers - Dr Doug Ebersole	Optical Physics - Edward Lai	SSI - rEvo - Paul Raymaekers
Break	30 mins				
15:00 - 15:45pm	Extending the Boundaries of Human Undersea Resilience & Performance - Dr Dawn Kernagis	HMS Vanguard - 100 Years Underwater - Profs Chris Rowland & Kari Hyttinen	Cueva de la Pena Colorada - Dr Andreas Klocker	How to shoot for contests and influence judges - Matty Smith	Palau - Pristine Paradises Spawning, Wrecks & Tec - Marc Bauman
Break	30 mins				
16:15 - 17:00pm	Recreational SCR vs Technical CCR - Paul Raymaekers	The sad fate of the HMS Perth - almost gone but not forgotten - Dr Kieren Hosty	Unlocking the Jenolan Caves mysteries - Deborah Johnston	OZTek2019 Underwater Photographic Competition Presentation including the 2019 Nikon Shot of the Year	Island hopping throughout the Visayas in the Philippines - Biggs Eggert
17:00pm	EXHIBITION CLOSES				
17:30 - 18:30pm	Than Luang - Thai Cave Rescue - Richard Harris & Craig Challen	Than Luang - Thai Cave Rescue - Richard Harris & Craig Challen	Than Luang - Thai Cave Rescue - Richard Harris & Craig Challen		



SATURDAY 16th MARCH 2019

8:00am — OZTek Pre-Registration & Ticket Sales Desks Open
8:30am — CONFERENCE DOORS OPEN

Theatre >	Gombessa Sponsored by Biancpain	Azimuth Sponsored by Nikon	Kraken	Scubapix Imaging Centre	Exhibitor Centre
8:55 - 9:00am	Welcoming Address Solomon Prize Draw - Sue Crowe				
9:00 - 9:45am	World Premier - HMS Royal Oak - 80 Years Underwater - Emily Turton	Technical Freediving - Kirk Krack	Rebreather Cannisters - Kevin Gurr	Topic - Speaker	Topic - Speaker
Break	30 mins				

SUNDAY 17th MARCH 2019

Theatres >	Gombessa Sponsored by Blancpain	Azimuth Sponsored by Nikon	Kraken	Scubapix Imaging Centre	Exhibitor workshops
8:30 - 9:15am	Under The Pole - Franck Gazzola & Julien Leblond	21 Years of CCR Business - Martin Parker	Cook Island Crystal Cave Discovery - Paul Hosie & Bruce Clulow	Topic - Speaker	Topic - Speaker
Break	30 mins				
09:45 - 10:30am	Dry Hypoxia - is it a good idea? - Simon Mitchell & Nick Gant	Talking Competition - Thibault Guignes	Polar Diving - Peter Szyzka	Talking video - Jon Shaw	Thalassa Resorts Manado - Simone Gerritsen
Break	30 mins				
11:00 - 11:30am	Going Undersea to Get Out to Space - Dr Dawn Kernagis	Diving in the Movies - John Garvin	Pressure - Lessons from the Deep - Adam Sellars	Topic - Speaker	Worldwide Dive & Sail - Mark Shandur
Break	30 mins				
12:00 - 12:45pm	Using CCR for Mesophotic reef exploration & discovery - Sonia Rowley	Tech diving near misses - Dr Peter Buzzacott	The Urban Water Odyssey - Nathalie Lasselin	Advanced Techniques - taking your underwater photography to the next level - Pete Mesley	rEvo - The New Horizon - Paul Raymaekers
Break	30 mins				
13:15 - 13:45pm	Camping in Cocklebiddy - Stephen Fordyce, Liz Rogers, Ryan Kaczowski	Solomon Island Deep Wreck Special - Pete Mesley	Diving and Australian Consumer Law - Dale Clapperton	Photographic workshop - Speaker to come	Diving & Snorkelling in Antarctica & The Arctic - Alex Fayan, Peter Szyzka
Break	30 mins				
14:15 - 15:00pm	Thoughtful Management of DCS - Dr Neal Pollock	Cold Caves of Canada - Tom Crisp	The State of Scientific Diver Training in Australasia - Simon Talbot	Over & Under Photography Basics - Matty Smith	Mares - Paul Raymaekers
Break	30 mins				
15:30 - 16:15pm	Scapa Flow 100 - A Digital Tour of the WWI German High Seas Fleet - Emily Turton	Freediving Forum - Michael Menduno	Tasmanian Remote Sump Diving & Camping - Stephen Fordyce	Topic - Speaker	Nikon New Mirrorless Z range - Chris Dalton
16:30pm (4:30pm)	EXHIBITION CLOSES				
7:30 - 11:30pm	OZTek Gala Awards Dinner - 'Lighthouse Gallery' - Australian Maritime Museum Awards Presentations, Food & Fun				

The Ultimate Underwater Adventure

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TANK CAVE MAPPING REVISITED

Story by Adrian Richards & Ken Smith

There is little doubt, as we head into 2019, that Tank Cave is the jewel in the crown of Mt Gambier diving and that the one-time contentious decision to purchase the site certainly seems to have reaped its rewards. Whilst the type of diving that can be enjoyed in Tank Cave is not for everyone, there is little doubt that it is what many CDAA members, and others from afar, aspire to. For those with a sense of adventure and high levels of commitment it is also a site that continues to deliver with the most recent connection with neighbouring Fossil Cave and further fossil discoveries being obvious examples. In the overall history of diving in the region, Tank Cave is a relative newcomer. Although initial exploration took place in the 1960s with more work being done in the early 1980s, it was not seriously pursued as a site with great potential until the late 1980s when significant discoveries of new passage were made.

The exploration of the full extent of the cave went ahead in leaps and bounds over a number of years, with so much passage being discovered there was soon a long list of CDAA members that were laying new line. It is easy to imagine the thrill of planning a relaxing Easter weekend of diving with a few buddies that actually resulted in the discovery of amazing new passage now bearing that weekend's name. On another occasion doing a dive to check out what may be a lead noticed during an earlier dive resulted in the divers involved opening up the entire S section. They were certainly heady days that for a while had people wondering whether the discovery of new passage would ever end.

With discovery comes not only the desire, but the necessity, to map the exciting finds and enable safe dive planning. Accurately mapping a cave of this complexity was a new challenge within established cave diving circles. Whilst a number of people were very experienced in producing high quality maps of most of the region's features, the traditional compass, knotted line and tape measure techniques are challenged by caves of Tank's complexity. Tank Cave had only one entrance and many sections within the cave were accessed through a single tunnel. This made closing a sur-

vey impossible and errors could be difficult to find. Those of us that have been diving the site for a while may well recall the discussion around the accuracy of a single compass reading at what was the sole entry point into the S section. There was no ability to close the loop resulting in a significant error in the map for some time. There were discussions at other times about error being introduced by way of miscounting of line knots, the reality being that a simple single error may have a compounding effect as the survey extended. That said, history tells us that the people involved in these early mapping endeavours did a simply amazing job and achieved results that in many cases were well validated by subsequent efforts.

As discoveries within the cave progressed it became increasingly obvious to some CDAA members that we needed to break new ground in terms of the mapping techniques employed. A group of people well lead and co-ordinated by a then very active CDAA member John Winkler, took up the cause. This was in the early 2000s when the buzz around terrestrial surveying was the use of Global Positioning Systems (GPS). Whilst it was felt that this had potential, the manner in which it could be harnessed remained a challenge. There were at least two substantial



The Thumper in use



'Pinger' being placed in Tank Cave by Phil Prust

issues that may have deterred those less committed but they in fact became a driving force leading to innovation that transformed underwater cave mapping around the world.

- The ability to transfer locations within the cave to points on the surface that may then lend themselves to GPS location was a fundamental hurdle. Various through-ground radio systems existed, but mostly for communication purposes and not location.

- GPS at the time was largely intended for use by the US military and, whilst hardware was available for consumer use, the signal transmitted by GPS satellites was deliberately modulated to reduce the spatial resolution. For the general public it could not achieve an accuracy of better than approximately 100 metres. This improved in early 2000 when the US removed this "Selective Availability" feature and it suddenly became possible for anyone to determine location to within 10 – 20 metres, a great leap forward, but still nowhere near the accuracy that was required.

The initial and perhaps greatest hurdle, transmitting underwater locations to a point on the surface with good accuracy was ultimately solved by Ken Smith in the development of the now well known "pinger" technology. Ken's physics combined with the electronic engineering expertise of his dive buddy Adrian Richards produced a system

that transmitted an audio frequency magnetic signal from within the cave in a manner that could be picked up by a surface receiver. This enabled the underwater location within the cave to be pin pointed on the surface. Problem number one solved. There was much work done on other technologies to perform this function and there were many dives undertaken with JDZ's version, known at the time as the "thumper." This was a more elaborate system with two-way communication between the dive and surface team. However, the simplicity and compact nature of the pinger system ultimately prevailed and resulted in its use in many caves around the world.

The second challenge was met by way a fortunate connection with a surveyor, Mark Oldfield, a Mount Gambier resident at the time. Mark, as one may expect, had fully embraced the use of GPS systems in his profession. Their inherent inaccuracy at the time could be overcome by tying a GPS "base station" into a point that was accurately known by way of traditional survey techniques. This allowed the use of what is known as a differential GPS technique that could locate points with an accuracy of around 2cm in all three axes. Mark established such a base station on a nearby hill called the Bluff where there was a convenient survey marker. Mark spent many long hours with the project team, often in very Mt



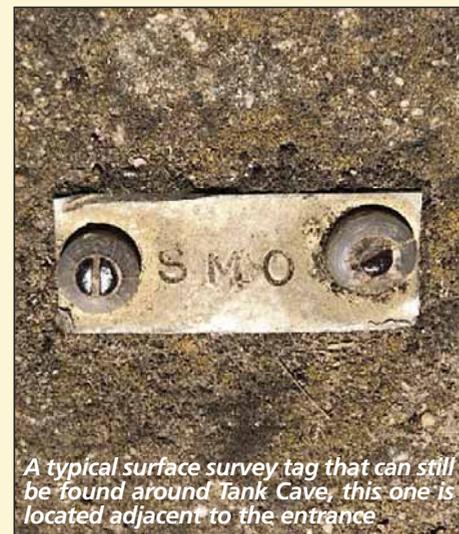
Surveyor Mark Oldfield working with JDZ on another "pinged" survey point

Gambier-like inclement weather, accurately placing a matrix of surveyed points throughout the paddock under which Tank Cave lies. The resultant grid of 25 points were subsequently marked with stamped metal tags via attachment to exposed rock, fence posts or pegs placed in the ground. These are still visible on the surface around Tank Cave. They were carefully positioned so that any point within the caves known boundaries at the time that was transferred to the surface via a "pinger" reading was less than 100m from three of the surveyed surface points.

Mark undertook this extensive work out of friendship, goodwill and a desire to be involved in such an interesting project. At the time it cost us no more than a nice dinner for him on a

Saturday evening, at which we talked shop of course!!!!

With the surface grid established the underwater work could begin. Divers would be despatched with up to three pingers to be located at tagged survey points within the cave. These would subsequently be located on the surface, with the position being marked with a peg. The next dive team would recover or relocate the pingers. The distance from the peg to the three nearest surface markers was measured with a 100m tape. This worked well except on the rare occasions when a cow may take a liking to the tape and have it for lunch. The use of three of the fixed survey markers ensured that an accurate location of the peg could always be made via triangulation. In many cases two survey markers would be enough. However, if the two survey markers and the peg were roughly in a straight line an accurate location of the peg could not be made. This technique became very finely tuned over dozens of dives, to the point where the surface location crew could track the dive team as they progressed through the cave with it only being necessary for them to stop and hold the pinger location for around 5 minutes whilst the surface location was pinpointed, the divers then moving on to another pre-defined point. Once the peg was located it could be added as a survey point to the map. The level of accuracy



A typical surface survey tag that can still be found around Tank Cave, this one is located adjacent to the entrance



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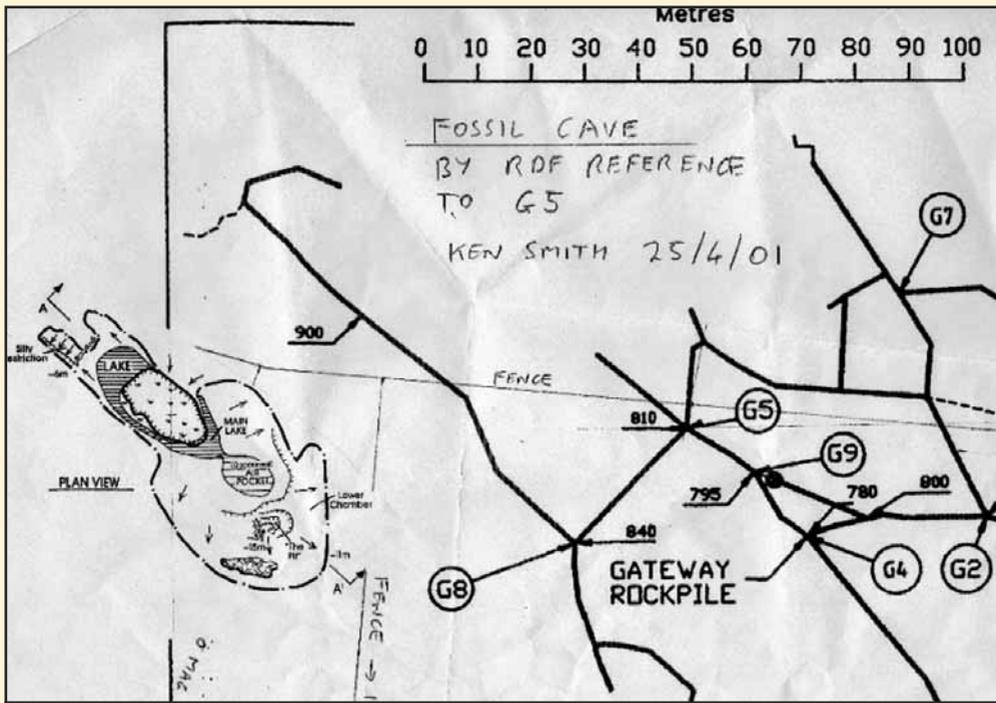


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The first real indication that Tank and Fossil caves may one day be joined

cy of the resultant map was certainly better than one metre. Depths were also recorded by the dive teams to add to the information base.

The next stage was to add passage wall details. Before each mapping weekend John Winkler produced 200:1 scale maps of the cave line survey. Scales were provided at regular intervals along the lines. These were provided on A4 sheets waterproof drawing film. Each pair of divers was allocated a sheet and a section of cave passage to map. The diver's job was to fill in the wall profiles on the map using the scales provided. Short distance could be estimated, but longer distances required a tape to be run as close as possible to the wall. This profiling information was then added to the overall map detail.

The most recent discoveries in Tank Cave gave us cause to reflect back to these early surveying days. Whilst there was always the belief that Tank and Fossil caves were part of the same system, an overlay of maps containing accurate land survey data first showed how tantalisingly close they were in 2001. Figure 1 shows a drawing pieced together by Ken Smith that was the very first

demonstration of this. Note that survey point designations have changed and points labelled as G8 and "900" had not been "pinged" at that time.

Underwater cave surveying is a passion shared by many that follows closely behind the initial exploration itself. CDAA members can hold their heads high in the full knowledge that the Association has a long history of not only discovery but also mapping and research on cave geology, biology and palaeontology. The mapping efforts described within Tank Cave represent hundreds of dives by many members involved in the John Winkler lead project and the development of new techniques and tools that were ground breaking at the time. The technologies remain in use to this day in many countries around the world, still being a leading technique in accurate underwater survey work.

Thanks to the unknown photographers that captured this period in Tank Cave's history.

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Diving into Sinkhole Gin

by Meg Anderson

You might be wondering why I am writing a review on alcoholic spirits (namely gin) rather than a gear review. Well this review is related to cave diving. For starters there is a picture of a diver on the bottle. And secondly the origins of this gin is Kilsby Sinkhole, a popular dive site for CDAA divers in Mount Gambier. Late last year the Kilsby brothers (Ben and Graham) along with their business partners (Kris and Stuart) invited the general public to share in the launch of their own gin, named Sinkhole Gin. I've never participated in a crowdfunding project before because I always worry it could be a scam but in this case I knew it would be legit. So legit that some divers questioned on Facebook whether they may have been "personally involved" in the ingredients (the Kilsby family's response on social media was that the water is actually sourced from the aquifer adjacent the sinkhole, not directly from the sinkhole itself). The crowdfunding proved very successful and they raised over \$50,000 to produce two batches each of gin and limoncello. In exchange for your contribution you received the product. In my case my contribution got me two bottles of gin and two bottles of limoncello. I was keen to get involved as I wanted the first batch bottles as a collector's item. Living in South Australia, I was also attracted to supporting a local business. While it was initially promised that the product would be delivered before Christmas, unfortunately they weren't yet happy with the limoncello when Xmas rolled around and I only got my shipment in January. However I did not mind and I appreciated their honesty throughout the whole process and their dedication to delivering a quality product.



I was not an early adopter of gin and growing up in a small town it was something older ladies drank while playing bridge or attending their monthly "stitch and bitch" (cross-stitching group) meetings. It has only been in recent years with the glut of boutique gins on the market that I have come to be a fan. In fact it was after a dive trip to Komati Springs in 2017, when I stayed at my friend's guest house not far from there that I was introduced to South African boutique gins. I realized gin had evolved from tasting like grass and became a fan. Gin is definitely becoming a more widespread and popular beverage and is no longer just reserved for older ladies. Eventually I realized I had a Guidelines deadline and that I had to taste test the gin for my review. I decided to test it alongside a more "commercial" gin for comparison and aimed to make the experiment as scientific as possible (oh who am I kidding here, it was my first relaxing Saturday in a long time and I wanted to unwind with some gin while watching Netflix). The Sinkhole Gin, while a tad cloudier, had a far superior taste for my palate. It was less sharp and more aromatic and floral. The Sinkhole Gin website claims the gin is fun, fresh and very, very drinkable with an aroma that will "knock your socks off." Compared to my comparison test drink, I found this to be definitely true (although I was not wearing socks at the time so I can't confirm that part). The ingredients

of the gin include muntries, a tiny native cranberry or 'emu apple', which grow wild along the South Australian coastline and were once a staple of the Ngarrindjeri and Boandik diet. Sourced through a local nursery for the first batch of Sinkhole Gin, the Kilsbys are planting more than 100 bushes on the property alongside the sinkhole, so fruit for future batches will be grown right on site. Other ingredients include juniper, honey, lime zest, lemon myrtle, chamomile, cinnamon, coriander and strawberry gum. I did taste test the limoncello as well, which is created with hand-picked farmyard lemons and features the Sinkhole Gin. I chilled a shot of it in the fridge and found that to be a tad too strong for me. The Facebook page suggests pouring over ice and enjoying straight up or adding fresh mint, lemon or thyme and perhaps a dash of soda. By this stage of the night though things were getting a little fuzzy and I decided to wrap things up. I'm sure Sinkhole Gin will continue to grow as a brand, while at a wedding in Mount Gambier recently I noticed a bottle behind the bar. At the time of going to press they had announced that retail sales of the gin will commence at the Royal Oak Hotel in Penola, which is a handy stop for those using the inland route between Adelaide and Mount Gambier. More stockists and online order options will be announced on the Facebook page: <https://www.facebook.com/sinkholegin>

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URGENTLY!

Expedition Bjurälven: The Cold Caves of Scandinavia

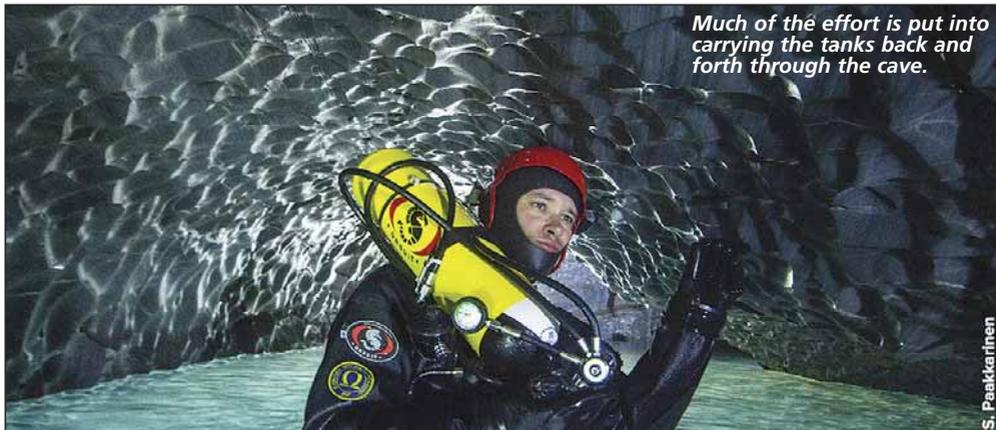
By Oscar Svensson. Photos by S. Paakkari

The cold hits us with full force when we submerge our faces in the water of a small mountain lake far up in the north of Sweden. The water temperature is just above freezing at about 0.5 degrees Celsius. With a backdrop of a winter landscape, we prepare for another long day under-ground. We don our tanks, drop under the ice, and navigate the entrance of what has become Sweden's longest under-water cave. It is remote, it's hard to access, the conditions are unforgiving, and it is absolutely stunning: all the ingredients for great exploration.

BRIEF BACKGROUND ON THE PROJECT

The small village of Stora Blåsjön (aka Big Blue Lake) is located just above the 64th parallel. The mountains surrounding the village are known for a number of caves stemming from small streaks of calcium-rich rock, which form a karst area otherwise seldom seen in the country. The Swedish Speleological Society has long been interested in this area. In the late 70s, during one of their cave searching expeditions, Bo Lenander became the first person to investigate the bottom of a small

mountain lake after he noticed the surface water move in a suspicious manner. Equipped with a Nikonos camera and a good-sized rock, he reached the bottom of the lake where he verified that there was indeed a small opening where the water originated. He even brought back a picture to prove his claim. This had to be the resurgence of the river that disappeared underground a few kilometers further up the valley. It would be thirty years before anyone actually made it into the cave and could see what lay beyond.



Much of the effort is put into carrying the tanks back and forth through the cave.

S. Paakkari



Sometimes, unconventional gear is necessary to make progress.

S. Paakkari

The Bjurälven Valley is surrounded by high mountains that see a lot of snow during the winter. As spring comes, the meltwater flows down the river, and then abruptly disappears underground only to reemerge a few kilometers later. The flow can reach over twenty knots, so it's not hard to see how this is a cave still actively being formed. With that kind of flow, the only safe time of year to go diving is before the snow starts to melt, which is why our exploration project occurs around March each year. At that time of year, about twenty enthusiasts from Sweden, Norway, and Finland gather to push further into the mountain, mapping and documenting the cave system.

EARLY YEARS

In the early days of the project, several obstacles had to be overcome, such as figuring out how to get all the equipment into the heart of a national park that lay far from any roads. Here the cold and snow are allies as they allow for transportation by snowmobile. This means of transport makes a minimal impact on the fragile environment; once spring arrives, all tracks just melt away. Another great ally in our efforts to reach the caves: the locals. The locals have always been and still are a great help with the whole endeavor, providing assistance by offering their time, gear, and knowledge. Generally, when the team arrives on site, about

1.5 m of ice covers the lake. Once we get through the ice, the entrance to the cave is still half-buried by gravel that needs to be dug out each year. Still, the early explorers soon realized the great potential of this cave and pushed on. By addressing each problem, over the years a capable team has emerged that continues to evolve. The team has improved its base camp to include tents with heating as well as the means to heat up food. Underwater, a system of safety cylinders has been deployed to address the many free flows experienced in the cold water. These things and more set a foundation still built upon today, almost ten years later.

WHERE WE ARE TODAY

Today, setting up the camp is a big project in itself, but it is usually an efficient process as not much needs to be changed from year to year. In a matter of hours, the team has installed changing tents with heat, a tent with microwaves, several generators, twin compressors, and even a sauna set up in the mountains. To address the physical barriers to the cave, the first dive team saws through the ice and clears the entrance with shovels. Even when the entrance is cleared, it's still a little squeeze to get in, and the cave is only accessible by sidemount. Many of the tunnels are fairly large, but there are a number of small restrictions, especially in the outer parts. This is one of the reasons that exploration has pro-



The original discoverer of the cave, Bo, doing precise radiolocation of the divers underground (Courtesy of Expedition Bjurälven)

gressed significantly in recent years. In 2013, an important milestone was reached: after staying relatively shallow for 440 m, the cave turned upwards to reach a dry chamber. This became a blessing and a curse at the same time. This large and spectacular chamber provided a safe haven of breathable air and relative warmth, but it also meant that further exploration included a fair bit of carrying gear over to the next sump. After that first dry chamber, exploration has yielded another three larger chambers, and three out

of the four require equipment to be carried out of the water. So an ever increasing distance from the entrance has also come with more physically demanding caving and increased risks.

MAKING A MAP

After running an expedition for many years with divers joining and leaving the team, it became clear that even though a great deal of cave had been mapped, it was time to take a step back and reset before continuing. Under the thrall of exploration, small deviations in mapping had accrued over the years that had resulted in a map that team members could no longer fully recognize. Therefore, a decision was made to reline and remap the outer parts of the cave and other sections where the accuracy needed improvement. The team had always set a high standard for the accuracy of the map, and to achieve this it has employed radiolocation. The original discoverer of the cave, Bo, is still an active member of the team. Although at age seventy he doesn't dive much anymore, he is an accomplished radio technician who spends much of his time communicating in Morse code to the other end of the world. With this competence he has built several iterations of radio beacons and receivers to accurately locate the divers' positions underground. Together with a high-precision GPS, the team gets fix points with around 50cm accuracy. In the cave the team decided to put numbered stainless steel bolts in the floor at some points so it can be sure they are there year after year. By overlaying the traditionally-made map created with compass headings and

distances with the GPS data, team members can now actually see how far off we are (or better yet, how close) and decide if a section needs to be re-measured. Any mapping effort can always be traced back to the nearest fix point. In 2016, large chunks of the map were redrawn and team members are now proud of the map we have and confident in its accuracy. Another great thing that comes with remapping sections is all the new tunnels that can be discovered. Where previously divers believed that a passage ended, a new diver with fresh eyes could suddenly find a new passage. A lot of line was added within just a hundred meters from the entrance, all in small side tunnels.

PUSHING FORWARD

Not only did the team remap and revisit old tunnels this year, we also had a few leads from 2015 that we wanted to check out. A lead discovered on the last dive of 2015 resulted in a whole new section of the cave in sump 2 being uncovered. Even though it seemingly pinched down in several locations, it is probable that next year someone will decide to revisit this section for another look. Another lead was a small tunnel with high flow coming out. This section was located at the end of an area of large tunnels with moderate flow, which suggested that it was likely the source of a lot of the water. The problem was that the tunnel was very restricted; it was mostly filled up with sand and gravel so the opening was about 20 - 30 cm high and about a meter wide. It was time to bring the gardening tools and start digging.

While some team members spent hours trying to dig through this hole, others decided to give the nearest dry section another chance. The digging proved to be a rather futile project, but in the dry area to the side, a passageway was found through some rubble.

Suddenly, we emerged into a huge collapse room. This was very different from the mostly smooth tunnels of the other dry areas, and every step through fallen blocks of stone had to be taken carefully. After navigating this chamber, a new pool of clear water was found that revealed a nice power tunnel leading straight in the direction the team hoped. There was no choice but to come back the next day and carry the tanks over to see where it led. This far into the cave, it typically takes about six hours to reach the end, explore, and get back out, although much of this time is spent carrying gear. To say one is tired afterward is a bit of an understatement. But all the tiredness and sore muscles are worth it the moment you attach that line and head into the unknown. The big lead of this year paid off with a large straight tunnel going off before the cave changed character again, going back to a low and wide area.

With this new lead, it was time to pack up and go home. Further exploration would have to wait until 2017, when the team would return in force.

HOPES AND DREAMS

Next year the team will return. The cave seems to be going strong even though where it is going is currently unknown. With the surface location,



Diver lighting up one of the stunning dry tunnels on the way. Extensive scalloping demonstrates the force of the water flowing through the spring.

S. Paakkari



The 2016 team of Expedition Bjurälven next to the entrance of the cave (Courtesy of Expedition Bjurälven)

and by looking at surface features, we will set the goals for the upcoming trip to make sure we are ready for whatever happens. To find out more information and to follow our efforts please visit www.expeditionbjuralven.se, and follow our Facebook page at www.facebook.com/ExpeditionBjuralven.

This article was reprinted, courtesy of 'Quest', The Journal of The Underwater Explorers - Volume 18, No.1

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SITE	LEVEL	OWNER	ACCESS DETAILS
MT. GAMBIER - SA Ewens Ponds	Nil	DEW	Groups of 6 or more, phone DEWNR on (08) 8735 1177 for booking. Smaller groups, no need.
Gouldens	BC	DEW	<p><i>Book online: www.parks.sa.gov.au.</i> Please note that these sites are listed under Piccaninnie Ponds Conservation Park on the website.</p> <p>Bookings must be made a minimum of 48 hours before the actual dive timeslot to allow for DEW to confirm your booking and details. You will receive a booking confirmation email once all indemnities have been received and CDAA qualifications verified. The DEW office in Mt Gambier is open 9am to 5pm, Monday to Friday, 08 87351177 or you can email DEW.SEOnlineBookings@sa.gov.au</p>
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Fossil	C		
Piccaninnie Ponds	BC	DEW	
Horse & Cart Tea Tree	BC BC	Dale & Heather Perkins Dale & Heather Perkins	Phone (08) 8738 4083 or email dhperkins@bigpond.com at least 24 hours in advance.
Little Blue	BC	District Council of Grant	Booking can be made online from www.cavedivers.com.au .
Allendale	C	District Council of Grant	Booking can be made online from www.cavedivers.com.au Obtain key from Lady Nelson Tourist Information Centre.
Ela Elap	BC	Dean & Carol Edwards	Obtain key from Management at Bellum Hotel.
One Tree	BC	Mr. Peter Norman	Visit the house before diving. If no one is home - no dive!
Dave's Cave	C		Maximum 3 divers all weekends between May & November inclusive (check and update on CDAA website).
Hells Hole	BC	Forestry SA	Booking can be made online from www.cavedivers.com.au . Show ForestrySA Permit to obtain key from Lady Nelson Tourist Ctr.
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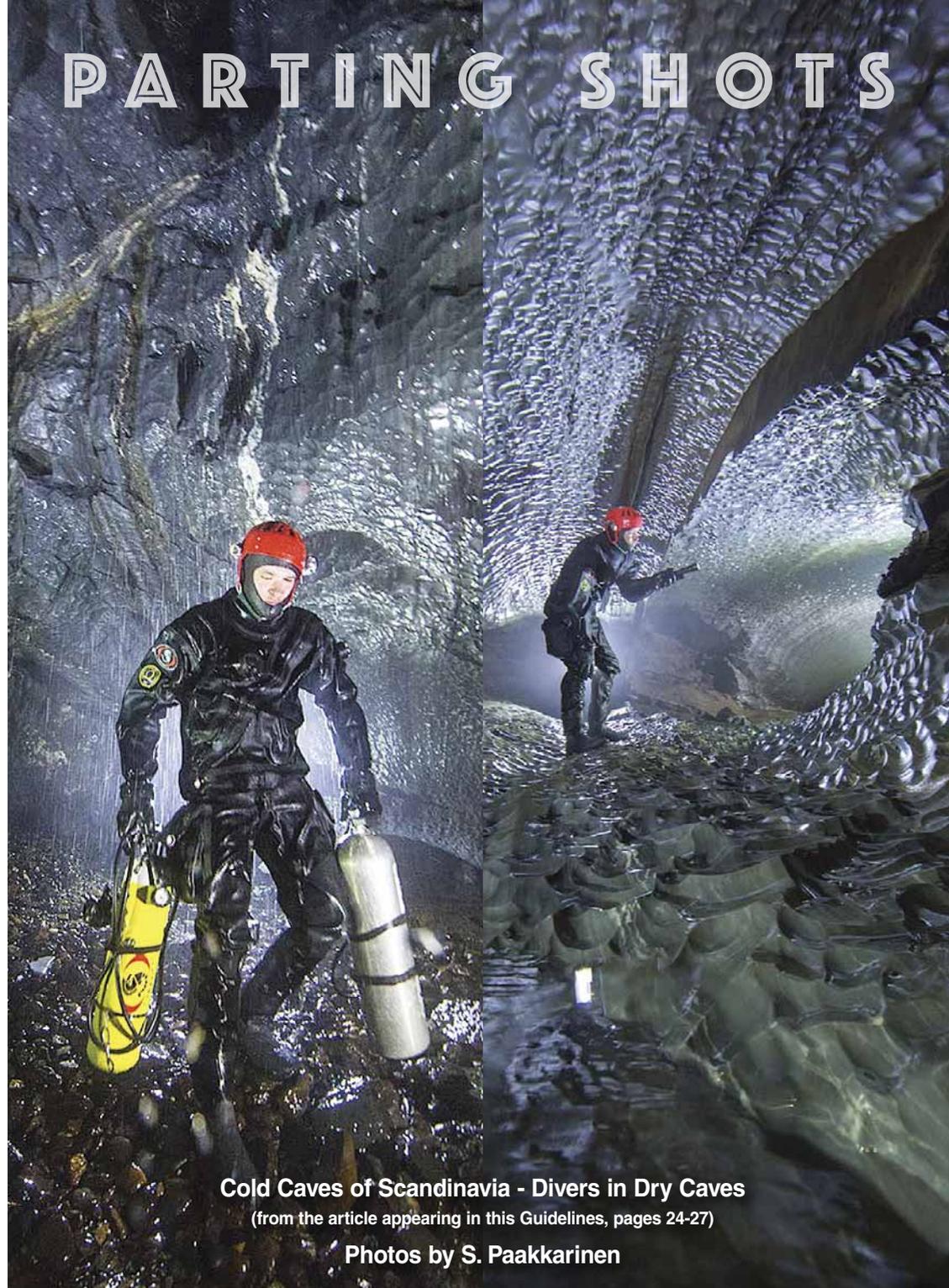
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- East - West	C AC	Lessee: Ph: 08 8723 5552 Owner:	
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Baker's Cave	C	Janet & Bruce Saffin	Bookings can be made online at www.cavedivers.com.au Booking Officer is Matthew Skinner. Email: bakerscave@cavedivers.com.au Climbing equipment required. One member must have previous dive experience at site.
NULLARBOR - WA			
Cocklebidy	C/AC	WA Dept of Parks & W'Life	Apply in writing for permission to dive at least 4 weeks in advance of trip to:
Murra El Elevyn Tommy Grahams	C/AC C	WA Dept of Parks & W'Life WA Dept of Parks & W'Life	District Manager, PO Box 234, Esperance, W.A. 6450. Phone: (08) 9083 2100.
Burnabbie	AC	WA Department of Lands	Apply in writing or email for permission to dive at least four weeks in advance of trip.
Olwolgoin Cave	AC	WA Department of Lands	Miss Shannon Alford, E: Shannon.Alford@dplh.wa.gov.au Department of Lands, Planning and Heritage, P.O. Box 1143, West Perth WA 6872. Phone: (08) 6552 4661 Fax: (08) 6552 4417
Weebubbie	S/C	WA Department of Lands	P.O. Box 1143, West Perth WA 6872. A site indemnity form must be filled out for each visit to the site. Form can be downloaded from the CDAA website. Diving permission acknowledged by official letter from Land Owner.
WELLINGTON CAVES - NSW			
Limekiln (McCavity) Cave	C/AC	Wellington Caves Management	Access coordinated by Greg Ryan Email: giryan@gmail.com Ph: (02) 9743 4157 Both Cave and Advanced Cave Level are being accepted for this site depending on its water level at the time. When entrance is under water, Advanced Cave Divers only!
Water (Anticline) cave	C	Wellington Caves Management	Access coordinated by Greg Ryan Email: giryan@gmail.com Ph: (02) 9743 4157 Affected by high CO ₂ levels during Summer/Autumn.

CDAА INSTRUCTORS

NAME	Basic Cave	Cave	Adv. Cave	NAME	Basic Cave	Cave	Adv. Cave
NEW SOUTH WALES				VICTORIA Continued			
 FEATONBY, Tim (CDAА 3327) Worworing Heights, NSW Mob: 0402 129 253 E: tim.featonby@hotmail.com	Yes	Yes	Yes	 DALLA-ZUANNA, John (CDAА 236) Mob: 0407 887 060 E: jdz@paintandcustom.com.au	Yes	Yes	Yes
SOUTH AUSTRALIA				 EDWARDS, Chris (CDAА 2247) Mob: 0417 116 372 Email: chrisedwards01@me.com	Yes		
 MAIN, Robert (CDAА 4909) Mob: 0411 519 825 E: rob@reef2ridge.com	Yes	Yes		 McDONALD, Warrick (CDAА 1882) Mob: 0408 374 112 E: info@ocean Divers.com.au	Yes	Yes	Yes
 PAYNE, Timothy (CDAА 2640) Mob: 0448 147 927 E: Tim@diveessentials.com	Yes	Yes	Yes	 MONACO, Rubens (CDAА 1731) Mob: 0413 429 533 E: info@idcscuba.com.au	Yes	Yes	Yes
VICTORIA				 MUSCAT, Tim (CDAА 4557) Mob: 0422 127 802 E: tim_muscat@bigpond.com	Yes	Yes	Yes
 ALLEN, Terri (CDAА 3483) Mob: 0419 176 633 E: terri.allen@monash.edu	Yes	Yes	Yes	WESTERN AUSTRALIA			
 BARCLAY, Gary (CDAА 1735) Mob: 0407 527 921 E: garinda@bigpond.com	Yes	Yes	Yes	 BICANIC, Josip (CDAА 4691) Mob: 0412 571 779 Email: joseph_b@me.com	Yes	Yes	
 BOWMAN, Jane (CDAА 1880) Mob: 0407 566 455 E: janelbowman@hotmail.com	Yes	Yes	Yes	 PAYNTER, Geoff (CDAА 3784) Mob: 0407 445 112 E: gpaynter60@bigpond.com	Yes	Yes	Yes
 CLARIDGE, Linda (CDAА 2214) Mob: 0408 052 070 E: garinda@tpgi.com.au	Yes	Yes	Yes				

PARTING SHOTS



Cold Caves of Scandinavia - Divers in Dry Caves
(from the article appearing in this Guidelines, pages 24-27)

Photos by S. Paakkari