

Australasian Hydrographer

February 2025



AUSTRALIAN
HYDROGRAPHERS
ASSOCIATION

AHA
Australian Hydrographers Association

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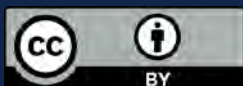
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Acknowledgement of Country

The AHA acknowledges the Australian Aboriginal and Torres Strait Islander peoples of this nation. We acknowledge the traditional custodians of the lands on which our association is located and where we conduct our business. We pay our respects to ancestors and Elders past, present and emerging. The AHA is committed to honouring Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to the land, waters and seas and their rich contribution to society.

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From the Editor-In-Chief Zac Ward



It's crazy to think we're already a quarter of the way through the New Year and even crazier still is the imminent approach of the biannual **AHA Conference** soon to be held in lovely Launceston. If 2023's impressive showing in Penrith is anything to go off I imagine this years will be bigger & better than ever with so many opportunities for learning, understanding, collaborating and networking. If you haven't already secured a spot, or better yet submitted a paper/abstract to present, I encourage you to venture out of your comfort zone and push your managers/employers to support you with attending. It's an invaluable experience, believe me.

Speaking of invaluable professional opportunities, the AHA Training Team continues to operate in full-swing with ongoing tours of Australian cities to provide formal training in the space of hydrometric monitoring. These tailor-made introductory sessions are a great way to motivate and inspire hydrographers within agencies to hopefully continue their water monitoring studies whilst supplementing water monitoring skillsets and gathering AHA CPD points in the process. John Skinner & the team do a great job so be sure to enquire about upcoming courses/training potentially in your neck of the woods.

And finally, I'd like to thank Tara Matthews & Edna Coetzee for pulling together so many great interviews and statements with regards to upcoming International Women's Day, 8th March. As an industry which sadly, still continues to be male dominated it's super important to have a continuing conversation & discussion around diversity/inclusion. Male allyship, challenging stereotypes and being a role model will help us all "Accelerate Action" as this year's theme builds focus towards.

The recent mass-influx of abstracts/papers for the upcoming AHA Conference is an indication there are a lot of budding contributors out there in *Hydrography-World*, so as always please reach out for article/photo submission for any future issues::

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Cheers,

Zac

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From the President Arran Corbett



As we step into 2025, exciting developments are on the horizon for the AHA community. Most notably, our new website is set to launch imminently, offering members a suite of self-service tools, including CPD points tracking, Certification requests, training management, and streamlined membership management. Be ready to sign in and explore these new features designed to enhance your professional journey.

This quarter, we also recognize International Women's Day—a reminder of the work still needed to improve diversity in our industry. A special thank you to Tara Matthews for curating journal articles that celebrate the contributions of inspirational female leaders in the Australian water sector.

Looking ahead, our biannual conference in Launceston this May is shaping up to be one of our best yet, with a record number of paper submissions and exhibitor sign-ups. This level of engagement will ensure a rich, educational experience packed with networking opportunities. A huge thank you to Agnes Zalan and the Blue Mountains Conferencing team for their dedication to organizing this key industry event.

Finally, a simple but vital reminder—stay safe and return home in one piece. Looking forward to seeing many of you in Launceston!

Arran Corbett

President, Australian Hydrographers Association

International Women's Day

March 8, 2025

Compiled by Tara Matthews
(Water Quality Community of Practice and AHA contributor)

A message from our 4-star partners

Arran Corbett

AHA President and Category Manager
Ninox Global

What positive changes have you seen for women in the world of Hydrography?

With 28 years in hydrography and business leadership, I've been fortunate to have several female leaders as mentors. Over the years, I've seen a steady rise in female participation in our industry.

Through my role with the AHA, I'm committed to supporting and accelerating this growth through meaningful action.



Tara Matthews and Edna Coetzee, both serve on the Australian Hydrographers Association Committee and were thrilled to contribute to this initiative. Tara is also a representative on the newly formed Water Quality Community of Practice. We're both thrilled to contribute to this initiative from the AHA and caught up with industry leaders who are to be celebrated.

This year's International Women's Day theme is 'Accelerate Action' and aims to acknowledge the strategies, resources and activity that positively impact women's advancement, as well as to support and elevate their implementation.

'It's an honour being welcomed by the AHA and the Community of Practice to see the initiatives that are ongoing in the industry and to be a part of the progression.'



Every year we see more women engaged in resource monitoring across Australia, and we are proud to present the following female leaders for International Women's Day 2025.

A big thank you to Jacquie, Sarah, Sanja, Krystal, Tierra and Stacey for their valuable insights into the industry.

Sarah Kate Dakin

Water Information Team Leader
Department of Climate Change, Energy,
the Environment and Water

What led you to the world of water monitoring?

I have always been passionate about the environment and started out my career in environmental consultancy undertaking flora and fauna surveys and GIS mapping. Through a friend of a friend, I heard about Manly Hydraulics Laboratory (MHL) and called up to see if there were any vacancies. There was a lot to learn when I arrived! I really enjoyed being in the field, understanding the different monitoring technologies and what it takes to produce monitoring data that is fit for purpose and communicating it clearly.

What is your favourite part of your role?

Collaborating across NSW Government/State Owned Corporations & Local Government's to improve the way we manage water, both as a Project Officer for the NSW Modelling and Monitoring Hub and Secretariat of the NSW Monitoring Community of Practice (CoP). Having the opportunity to meet and learn from people throughout the water industry in this forum has been a big highlight for me.

What is your proudest career achievement?

It is not so much one career achievement for me. Day to day I am proud of my team members when I see them master new skills, persist with difficult problems, and build strong client relationships.

Are there any emerging trends that have piqued your interest?

I am very interested in automated data quality control and near real time calculation of



measurement uncertainty – especially for flood data where decisions need to be made quickly and is important for the safety of the community. Perhaps this could be a theme for an upcoming NSW Monitoring CoP meeting!

What advice do you have for anyone who is considering a career in water monitoring?

The water monitoring industry is always moving and changing, take any opportunity to keep learning, especially if it is outside your comfort zone.

What's your International Women's Day message and what does this day mean to you?

Diversity in the workplace, whether it is gender, age, culture etc, makes for a resilient and innovative workplace. IWD is one of many days to reflect and celebrate our different and valuable contributions at work, home, and the community. I am thankful for my colleagues at MHL and look forward to seeing the diversity in our workplace continue.

A message from our 4-star partners

Edward Couriel

Director, Manly Hydraulics Laboratory and River Murray Joint
Programs Water Group
Department of Climate Change, Energy, the Environment and Water



What positive changes have you seen for women in the world of Hydrography?

In my 40 years of water industry experience, I have always noticed how well women bring diverse perspectives and experiences to decision-making and how they promote inclusive and collaborative work environments. I'm most pleased to see a significant increase in the number of women entering the field of hydrography, including technical and leadership roles, driving innovation and performance.

It's also encouraging that most organisations now actively promote gender diversity and inclusion and offer more flexible work environments that create more balanced and equitable workplaces with higher levels of engagement and associated results. I still think we have work to do to encourage younger girls in our schools to take a greater interest in our waterways and oceans so that hydrographer gender stereotypes no longer exist.



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Sanja Shoban

Hydrometric Officer

What led you to the world of water monitoring?

I have always been passionate about the environment and started out my career in environmental consultancy undertaking flora and fauna surveys and GIS mapping. Through a friend of a friend, I heard about Manly Hydraulics Laboratory (MHL) and called up to see if there were any vacancies. There was a lot to learn when I arrived! I really enjoyed being in the field, understanding the different monitoring technologies and what it takes to produce monitoring data that is fit for purpose and communicating it clearly.

What is your favourite part of your role?

I appreciate the diversity of work that I undertake in various work sites and conditions. My day-to-day activities include hydrometric monitoring, water quality, sampling and dam safety.

Being able to experience the catchments at different stages and monitoring after events throughout the year during extremities including droughts and flooding keep my role interesting with lots of variety.

We use industry leading monitoring equipment including dopplers, drones and ADCPs, and are upgrading our network which we get to contribute to.

The role also includes travelling where every day your office is different. The variety of landscape we experience in Australia is unique, eye opening and rewarding.

If we travel west we experience agriculture, north we experience tropical climates and if we travel south we experience mountain ranges.



What is your proudest career achievement?

Completing my traineeship and becoming a hydrographer within my team and being able to contribute confidently and effectively.

Moving up to Queensland after University and taking the courage to take another adventurous path from what I studied to a place of discomfort to a role I thoroughly enjoy is one of my proudest achievements.

Are there any emerging trends that you have piqued your interest?

Emerging trends in the industry include the change from Alert 1 to Alert 2. The change is an upgrade to our alert and flood warning network.

This is such a hot topic in Queensland, and we collaborate closely with the Bureau of Meteorology and Government Departments. The safety element is really inspiring as we look to invest in automated monitoring techniques.

What advice do you have for anyone who is considering a career in water monitoring?

It is well worth talking to someone in the industry so you can have a better understanding of the avenues you can take. It is a rewarding, enjoyable experience that's can also be physically demanding.

A passion and interest in the industry and the work that you are undertaking is important if you want to increase and diversify your skillset.

Collaborating with others in the industry is crucial as well as relationships are critical in this space.

What's your International Women's Day message and what does this day mean to you?

Be confident in who you are, and the skill sets you bring to your work. It's important to not doubt yourself and realise my contribution to the team is important.

I love being part of an industry where I am outdoors and in hands on environments but also enjoy and appreciate my femininity and owning it..



A message from our 4-star partners

Amanda Cameron

Laboratory Products and Strategic Suppliers Director
ThermoFisher Scientific



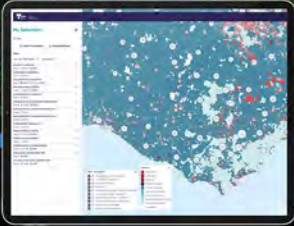

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Why do we need more Women in Leadership?

Diversity in leadership is an area I'm passionate about, particularly because diverse perspectives and insights ultimately help us shape a world and an environment that is a better place for the next generation.

Women bring unique insights and experiences to the table, leading to more innovative and effective problem solving and I think from a leadership perspective, women also have a very authentic and often empathetic approach that helps give room for people to be themselves.

Women in leadership roles also serve as role models and mentors for younger generations and inspire them to aim high and break through barriers, and I think this creates resilience and impact. As I've witnessed during my own career, balanced and diverse leadership teams create a stronger and more unified approach and ultimately deliver better and more well-rounded decisions and solutions. Coupled to this, there's evidence that diversity in leadership leads to better business performance and economic growth, something that we all want for future generations.




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Krystal Hoult

Senior Project Manager
ALS Hydrographics

What led you to the world of water monitoring?

I did a Bachelor of Science and Technology of University of Waikato, which had a work experience component, and one of the subjects was Hydrography which was with Northland Regional Council.

I had to do a report and said Hydrography was not for me, though it was a nice summer job, however I have now been in the industry for 20 years.

From New Zealand, I finished my degree with specialities in soil science, hydrology and coastal sciences and hydraulic modelling which resulted in a well-rounded education.

Before I came to Australia, I worked for equipment manufacturers Scott Technical Instruments and a regional council and then went to consulting.

What is your favourite part of your role?

My favourite part is supporting the hydrographers, and I love being a mentor for the up-and-coming people new to the industry.

The variety is great, and there are lots of options and pathways to follow. The people within ALS Hydrographics and the industry in general are great to interact with. The industry is so down to earth.

Where we fit in the water industry is very real with monitoring and validating to confirm what is going on in the real world. Hydrography is critical for monitoring our water resources which is so important in Australia. The work we do has so many people using the information we are collecting and it's easy to lose sight of the importance of what we do.



What is your proudest career achievement?

My proudest career achievement is the Australian Hydrographers Association Fellowship (AHAFA). This completely took me by surprise, and it was announced at a conference where I could celebrate with my colleagues.

Are there any emerging trends that have piqued your interest?

My number one is passion is safety in the work we do. There are so many things we can use with boats, imagery and drones that keeps our colleagues safe and out of the water.

I've experienced loss in this industry due to workplace accidents, and so safety is paramount and should always be so we can all go home to our families.

What advice do you have for anyone who is considering a career in water monitoring?

Do it! It's fun, from the outside it can be tiring though. You can do it all over Australia and overseas and there is so much flexibility as every site is different. There are so many options and pathways. Work experience and internships are great and gives you a taste for the industry.

ALS Hydrographics give you a taste for the industry and I encourage everyone to give it a go. We have a strategy with recruitment to give insight into the industry with videos, careers days and access to senior people as mentors.

What's your International Women's Day message and what does this day mean to you?

I think this day is great as diversity is so important. We need to innovate in this industry and diversity encourages us to think differently.

Women see things differently with experiences in life and are such an asset across a wide range of areas with so many ideas and empathy.

Diversity allows us to move forward and expand to areas where we didn't think was possible and women are just so capable of many things.



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A message from our 4-star partners

Josh Soutar

General Manager of Xylem Analytics, Australia and New Zealand
Xylem



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Let's Solve Water

How can men and women break down barriers – together?

Breaking barriers requires collaboration, respect, and a commitment to inclusivity. It starts with acknowledging biases, fostering open conversations, and ensuring equal opportunities. At Xylem, we actively promote diversity through mentorship, leadership programs, and inclusive hiring. By championing allyship and valuing talent over gender, we create workplaces where everyone can thrive.

What's your International Women's Day message?

International Women's Day is about celebrating progress and driving real change. It's not just about recognising women's contributions but ensuring workplaces foster equal opportunities for all. At Xylem, we support this through initiatives like the Women's Network, leadership development programs, and policies promoting equity and strengthening our businesses and communities.

Tell us about the women who inspire you and how?

I've had the privilege of working alongside and learning from remarkable women who have shaped industries, challenged the status quo, and led with resilience. Whether it's colleagues who bring innovative solutions to complex problems, mentors who lead with authenticity, or industry pioneers breaking new ground, their impact is undeniable. Their ability to navigate challenges while driving meaningful change serves as a constant source of inspiration.

What positive changes have you seen for women in the world of Hydrography?

Thanks to industry-wide efforts toward inclusion, more women are stepping into leadership and technical roles in the hydrography and water industries. At Xylem, we champion diversity through STEM outreach, training, and mentorship, ensuring more women have opportunities to lead and contribute to solving global water challenges.



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Tierra Martin

Hydrographer
Ventia

What led you to the world of water monitoring?

I've always been passionate about the environment and the outdoors. I live in a town along the Murray River, the town is full of horticulture and has high salinity issues. During my studies, my eyes were opened to the water quality of the river, irrigation lakes, wetlands or saltpans throughout the town and the impact they have towards the soil, flora, and fauna.

What is your favourite part of your role?

Within my role I'm lucky to explore places that I never would have known existed and experience new opportunities. Each client or organisation that we are subcontracted to requires a variety of different tasks/ works to be completed, allowing me the opportunities to develop new skills and knowledge.

What is your proudest career achievement?

I recently completed a Diploma of Water Industry Operations specialising in Hydrometric Monitoring, so currently this is my proudest career achievement.

Are there any emerging trends that have piqued your interest?

AquaWatch - A system which combines data from water sensors and satellites, processing the information with advanced data analytics to provide near-real-time water quality monitoring and forecasts providing early warning of harmful events such as toxic algal blooms, blackwater and runoff contamination.



What advice do you have for anyone who is considering a career in water monitoring?

To have fun and enjoy every opportunity that is given to you. Pursuing a career in the industry can be an incredibly rewarding and impactful path.

What's your International Women's Day message and what does this day mean to you?

Together, we can create more equitable and sustainable world for everyone. Support one another, share your knowledge, and inspire the next generation of women to join the industry. To me, International Women's Day represents the achievements and contributions of women from a variety of fields and cultures. It's a day to celebrate progress while acknowledging that there is still work to be done.



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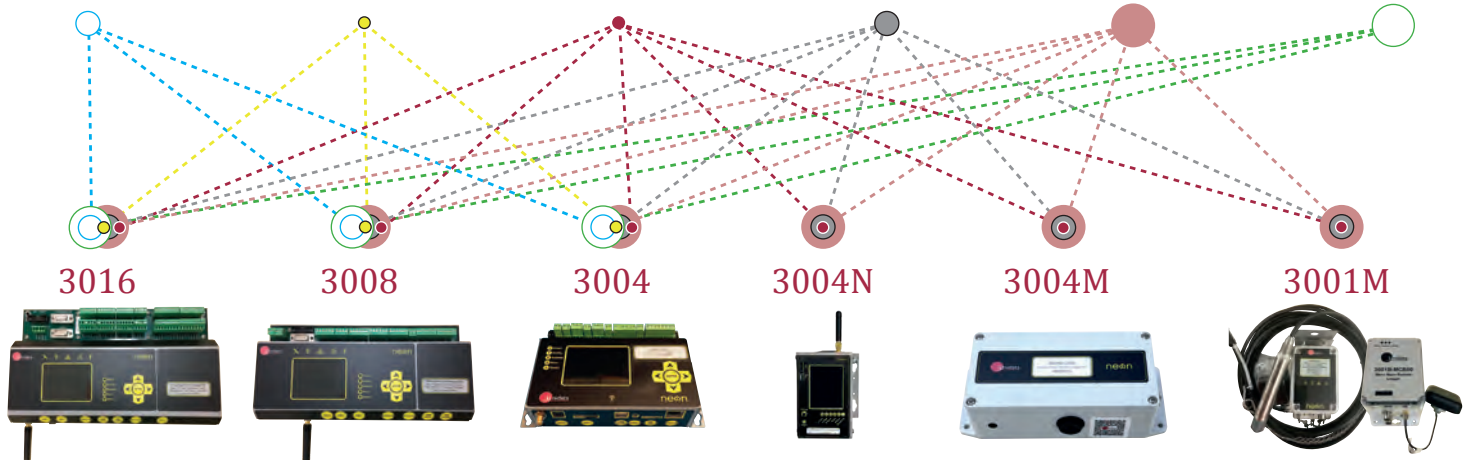
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Jacquie Bellhouse

Senior Hydrologist and Climate Change Scientist
Water Corporation

What led you to the world of water monitoring?

You could say that hydrometry is in the family. My father is a hydrographer and from an early age, during the school holidays, I would accompany him on station visits to give mum a break. Later when I was in my final year of High School, and trying to decide on a career pathway, I had the opportunity to attend some of the catchment research projects he was working on. This was great as I had access to some passionate STEM professionals.

I particularly enjoyed exploring the waterways, and the flora and fauna within and around them (there was always a bucket of tadpoles on the porch). Later I went on to complete a BSc in Biology which I later found had a surprising amount of cross over with the hydrographic discipline. As a result, even before I had graduated, I began working for my father who had left state government employ to startup his own hydrometric consultancy business.

It is during this time that I was lucky enough to have the opportunity to learn from several knowledgeable experts in the field including Kelvin Baldock, Russel Marks (AHA Member Profile – Russell James Marks, Australian Hydrographer July 2019), Alan Deane, Brian Chester (Remembering Brian Chester, Australasian Hydrographer 2013), Keith Barrett (Vale – Keith Barrett, Australasian Hydrographer January 2022). It was the combined influence of Alan Deane and Russell Marks who encouraged me to join the AHA and expand my professional contacts beyond WA.

What is your favourite part of your role?

I am very fortunate, when I was a trainee the philosophy was to rotate us around all aspects of the role from the field to the office. I even spent some time later managing the instrumentation workshop. It turned out I am a very analytical person, so while I loved my time in the field, in particular the achievement from establishment



and polishing a new site, I excelled at the data validation and rating derivation aspects of the role as well as the analytics and reporting, I also developed a skill for databases and data management.

It is not surprising that, given the well-rounded hydrometric knowledge I developed in the first ten plus years, I moved into the role of Senior Hydrologist in the Water Corporation and a Climate Change SME. Today I get to combine my hydrometry, hydrologic and biological skills to protect WA's unique resources and environment.

What is your proudest career achievement?

There are a number across my time. My first time attending and presenting a Poster Paper at the 2008 AHA Conference, on the Gold Coast, springs to mind. Not only was I a first-time mum juggling a toddler and a paper, but I managed to swing approval to travel from WA to the Gold Coast. It turns out I was the first Poster Paper at an AHA conference. It was however quite daunting; I was in the minority in what was still a male dominated field. In 2014 I presented my first paper at the Sydney AHA conference (although the preceding, award winning, paper was a very daunting act to follow). This and the subsequent papers in 2018 and 2022 were each important opportunities to build confidence. Thanks to these opportunities I developed the confidence to speak to a range

of national climate change and hydrology conferences and even an International Symposium.

As far as furthering Hydrometry, the development and final publication of the Hydrometric Guidelines was a big step forward which I have been proud to be a small contributor. Even better the ongoing effort hydrographers around Australia have put into helping maintain and expand the guides is something I have been privileged to witness as a repeated sponsor.

Other achievements include the recruitment of some pretty talented "new blood" into the profession, the evolution of the Australian Hydrographers Journal during my time as Editor, six years as a member on the AHA committee and more recently the leaps and bounds we have made in WA re-establishing and upgrading historic monitoring sites with a view to our future.

Are there any emerging trends that you have piqued your interest?

As the Corporations SME on Climate Change Science, with a focus on Hydroclimate and Ecohydrology, I have a particular interest in the ongoing evolution of IoT. More cost-effective remote monitoring has huge benefits in our fight to adapt to a changing climate. That includes watching with interest the evolution in the groundwater space and the ongoing development of non-contact flow measurement technology and methods.

I currently work across WA (~ 2.6 million Square Kms) From Kununurra right down to Esperance. The common theme across Water Resources and environment is the continued risk, to their well-being, due to a changing climate. Any tool and professional knowledge, that we can employ to help us rapidly manage the risks, is of particular interest.

What advice do you have for anyone who is considering a career in water monitoring?

Welcome, you chose a great profession to get into! Where else can you have the option to work outside in a wide range of environments or in the office playing with numbers, if that's your bent? My advice is to persist, it can be a little challenging

to get into the field in WA (we don't all have family in the business) so be prepared to start at the bottom if you need to. I started with filing visit sheets into our station files, calculating discharge measurements on the side of streams and cleaning and servicing equipment. While that sounds very menial it gave me the opportunity to talk to some pretty smart and knowledgeable people and learn. I have lost count of how many times I have pulled those lessons back out in the course of my work or passed them on to someone else.

The history of our profession is also an interesting thing to understand if you have the time.

What's your International Women's Day message and what does this day mean to you?

Let's face it, historically Hydrography has been perceived to be a male dominated field (after all less than 10% of the papers presented at conferences and published in the Journal have been authored by a woman, of 13 fellowships awarded to date only one is a woman). Some of that is no doubt linked to the historic nature of the job and job conditions, however, that is history. Today women are just as capable of fulfilling the role in all its forms and we may just bring a different perspective.

I am by no means attributing blame in any one direction. The lack of diversity in the profession is the product of a range of influences, including our own psychology. As women we sometimes can be too hard on ourselves, so I see International Women's Day as an opportunity for me to encourage my female counterparts to just have a go. Put forward that new idea, go for that job (even if you don't think you meet 100% of the requirements), write that paper you have floating around in your head and submit it, make the time to talk to others in the trade or maybe go all in and put your name forward for the AHA Committee.

In the future when I attend AHA functions or read the latest list of recognised contributions to the profession, it would be nice to see more balance in the demographics.

A message from our 4-star partners

Samantha Bray

Project Development Coordinator
Ventia



Why do we need more women in leadership?

Women in leadership positions are often able to bring a different perspective to a problem or a team management issue to the men around them. In the competitive environment we are often faced with, finding a new perspective can make the difference between moving forward and standing still.



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Stacey Kalaitzidis

Regional Manager, Northern Victoria
Ventia

What led you to the world of water monitoring?

I started scuba diving when I was 12 years old after seeing my dad do it for many years. Scuba diving is what led me to develop a love for nature and aquatic ecosystems. I ended up studying Environmental Science at university and knew I wanted to transition into an environmental monitoring role

What is your favourite part of your role?

There are so many things I love about my role. I get to be out in nature, I am constantly learning new skills and the best thing is that no two days are ever the same.

What is your proudest career achievement?

I am proud of myself for many of the new skills I have acquired since entering the environmental monitoring field. However, overall, my proudest achievement is being promoted to regional manager of the Northern Victoria Team.

Are there any emerging trends that have piqued your interest?

The use of drones to capture flow data fascinates me, I am keen to see where this new technology trend will take the Hydrographic industry, both from a data collection and data accuracy point.



What advice do you have for anyone who is considering a career in water monitoring?

Environmental monitoring is a great career for anyone who loves to learn a diverse range of skills and obtain knowledge in multidisciplinary areas. There can be challenging days, but it is incredibly rewarding reflecting on everything that's been accomplished.

What's your International Women's Day message and what does this day mean to you?

It's so inspiring to see more women transitioning into male dominated industries. International Women's Day is a great time to reflect on how much has changed in the last 30 or so years in terms of gender diversity in the industry. I look forward to seeing this continuous trend unfold, including having more women in leadership roles.

Training News – Introduction to Hydrometric Monitoring

John Skinner (AHA Training Coordinator)

Following strong interest from the hydrographic community in 2023, the AHA Training Team prepared and delivered a number of face-to-face training courses in 2024. Courses were facilitated in classroom and field environments providing a comprehensive overview of theory and field applications of:

- Hydrography (WHS)
- Hydrography (General Overview)
- Water Level Sensing (Theory)
- Manual Discharge Measurement (Theory and Practical)
- Discharge Ratings Overview
- Survey (Theory and Practical)
- Water Quality/Sampling (Theory)
- Hydrometric Site Operations and Maintenance
- Hydrometric Data Management and reporting



Four courses have been delivered with training undertaken in Melbourne (March and April), Brisbane (June) and Perth (November). In addition, a modified course was delivered as part of the Water Monitoring Skills event held in Darwin (September).

To date more than 60 hydrographic personnel have attended these courses, coming from a wide range of employers listed below:

- Bureau Of Meteorology
- Water NSW
- Ord Irrigation
- Department for Environment and Water SA
- ALS
- Ventia
- Hydro Tasmania
- EWS WA
- Department of Primary Industries & Regional Development WA
- Water Corporation WA
- Department of Environment, Parks & Water Security NT
- Department of Water & Environmental Regulation WA
- Department for Regional Development, Manufacturing and Water (QLD)





NWPGEN034 – Operate and maintain flood warning sites

In 2024 the AHA, in partnership with the Bureau and industry experts delivered Flood warning site operation training to various Councils in Queensland.

Further courses will be delivered in 2025. Training courses can be tailored to meet specific industry needs.

Diploma NWP50118 – Water Industry Operations, Hydrometric Monitoring

Semester One 2025 kicks off on 1st March. There are currently more than 70 students enrolled in the Diploma. This year we anticipate introducing a new elective subject – **MSS025034 – Collect and Evaluate Groundwater Data**. This unit will be presented in partnership with HydroTerra out of Melbourne. We are also working to get **MSS024019 – Collect and Evaluate Meteorological Data** available for Semester Two 2025

Trainers – The AHA community has members with significant knowledge and experience. The Training team is always keen to talk to anyone who may be interested becoming involved in industry training.

For enquiries, please contact the AHA Training Co-ordinator John Skinner:
M: 0409 222 378
E: training@aha.net.au

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- > Free enrolment for the AHA Diploma Water Industry Operations (Hydrometric Monitoring)
- > Strong R&D focus allowing for exposure to Photogrammetry/STIV, ADCP's and sonar




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AquaWatch Australia – An integrated ground-to-space water quality monitoring system

A presentation from the AHA Conference 2023.

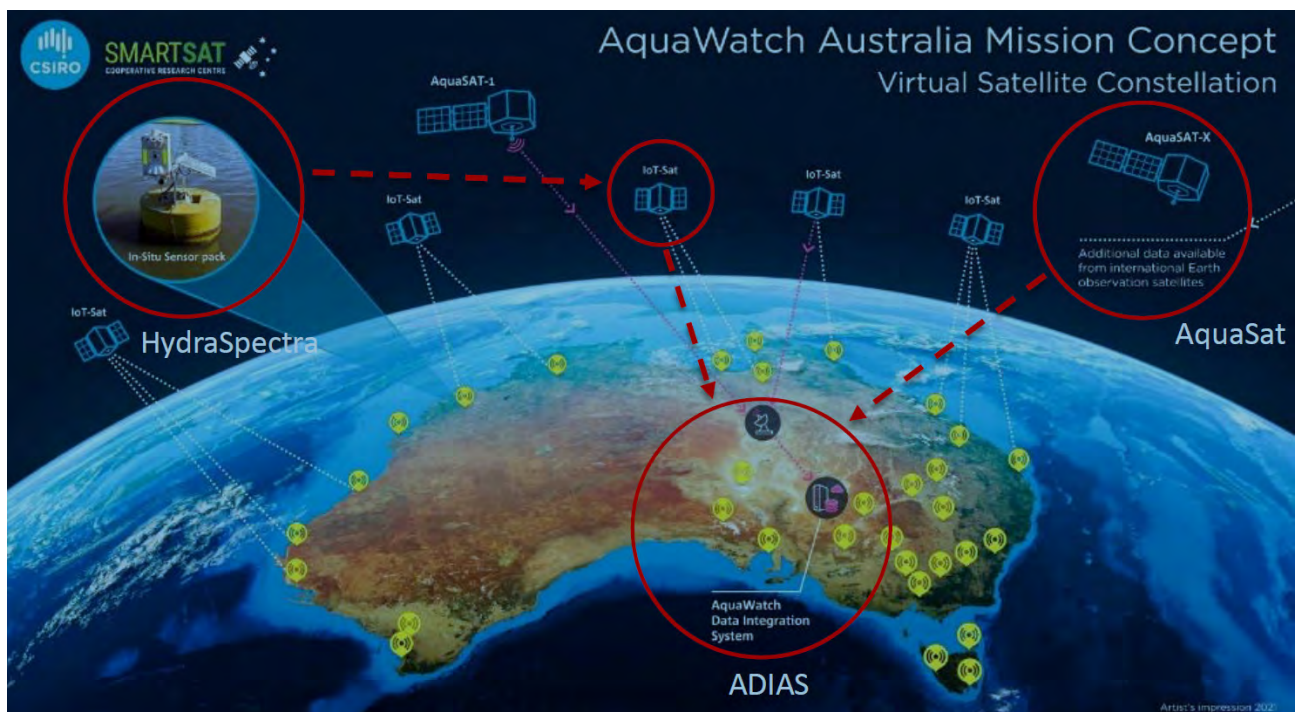
Dr Neil Sims (Interim Deputy Lead, AquaWatch Australia. Program Manager, Space Technology Future Science Platform)

Tim Malthus, Nagur Cherukuru, Xiubin Qi, Faisal Islam, Klaus Joehnk, Dr Alex Held (AquaWatch Director)



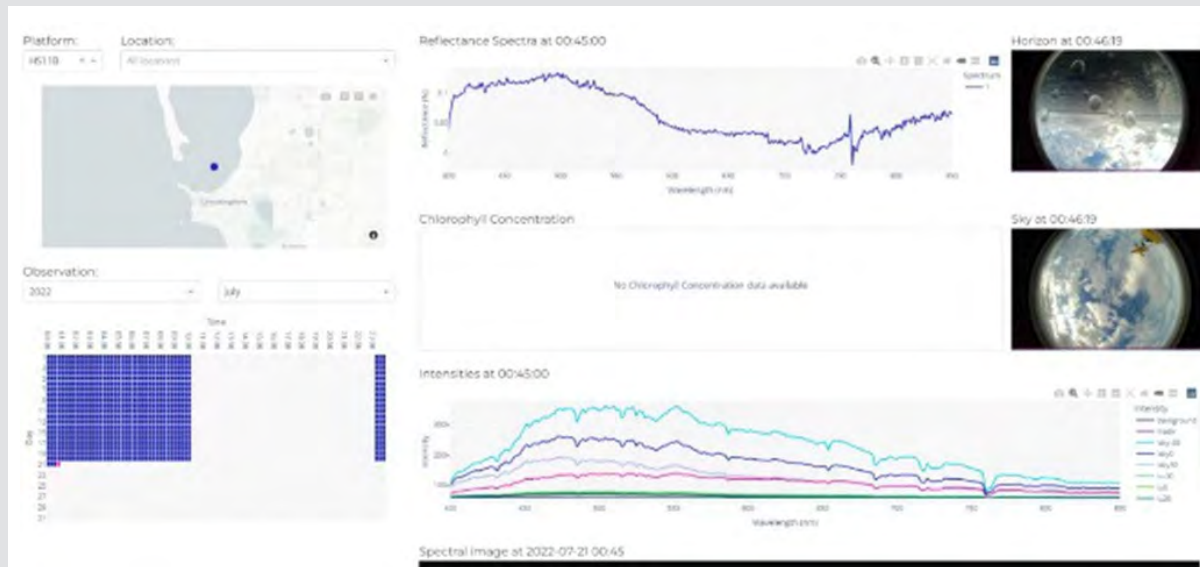
AquaWatch Australia – a weather service for water quality

- World's first integrated ground-to-space WQ monitoring system
- Forecast a few days in advance
- Reduce impacts from harmful water quality events
- **National goals**
 - Improve availability and accuracy of WQ information
 - Harmonise WQ monitoring
- **Global goals**
 - Be the world's best WQ monitoring system
 - Provide WQ information to ~3b people at risk



Hydraspectra

- Measures above- surface reflectance to support continuous:
- Algal bloom alerting
- Water quality monitoring
- Satellite validation
- Patented technology, low cost, low maintenance



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Hydraspectra – field deployment

- Accessibility, stability, OHS



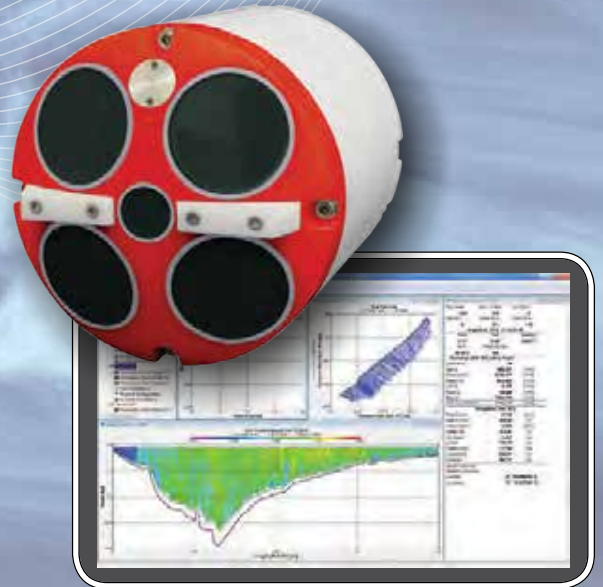
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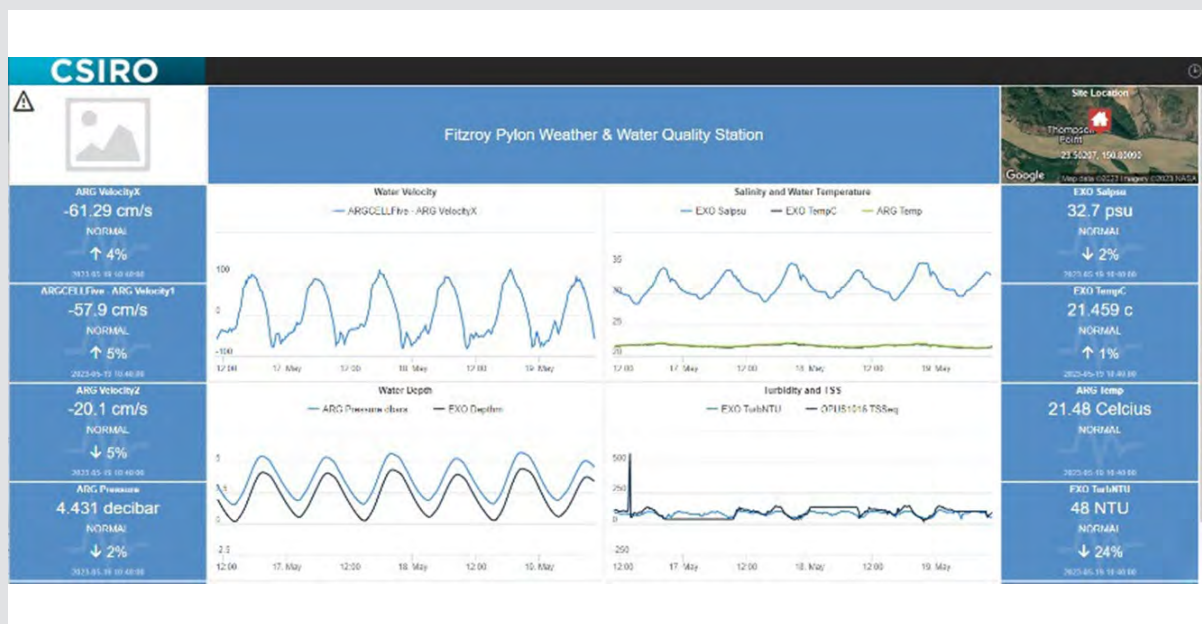
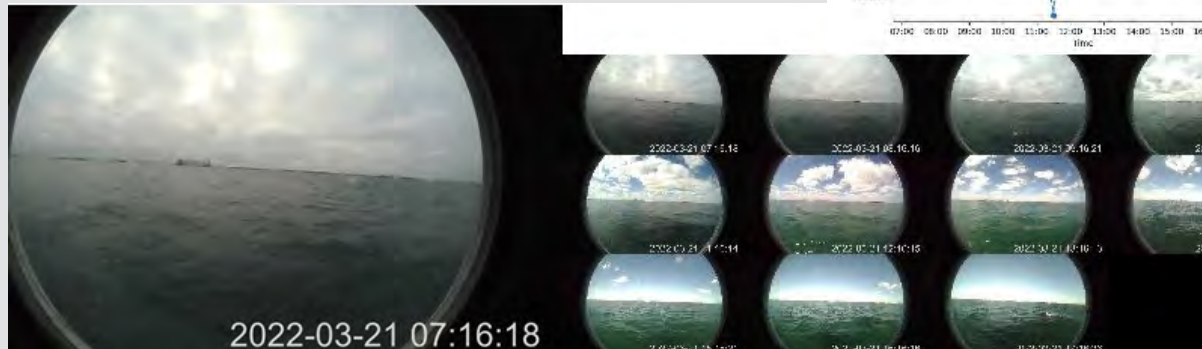
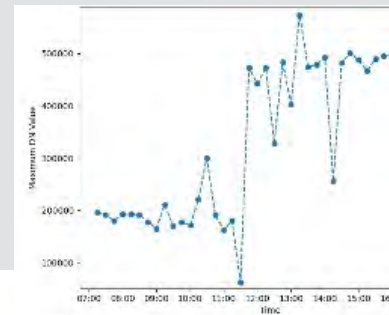


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QA/QC

- Step change in signal intensity
- Change in cloud cover
- Compare HSS to hemi images
- Camera exposure time as quality indicator



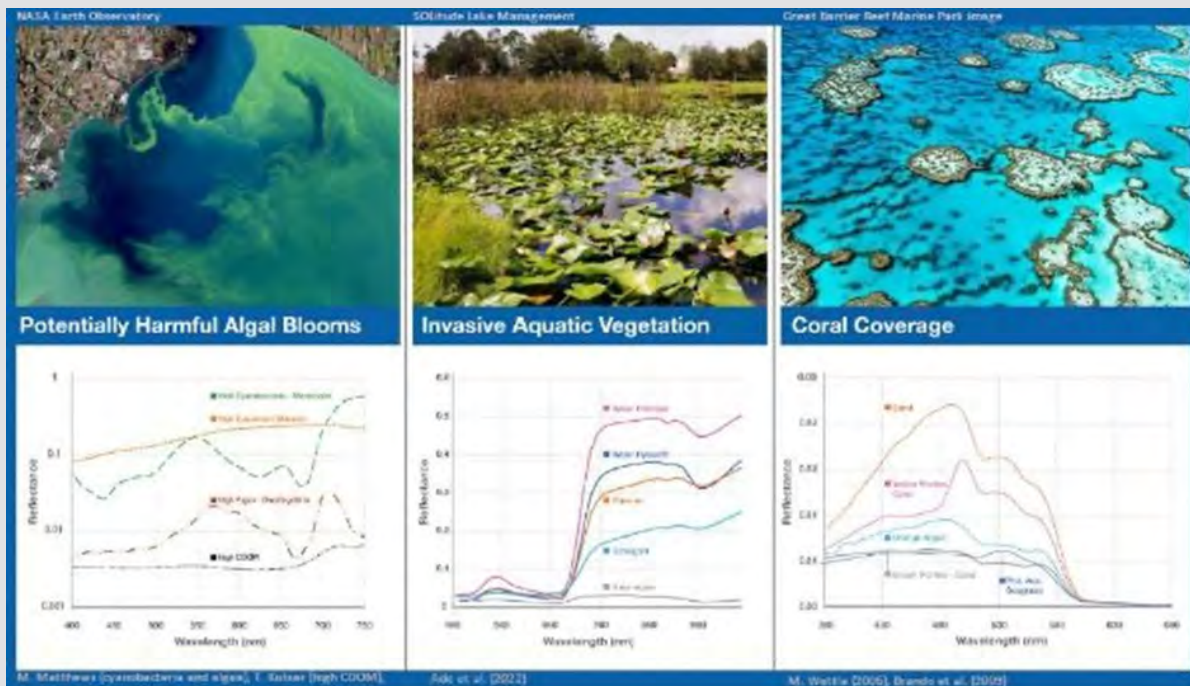
Fitzroy River Pylon

Maintenance & Calibration

- Fouling, sensor drift – eagle.io dashboard and warning system
- Monthly/bi-monthly calibration – comparison with grab samples
- AI/ML for anomaly detection – potential 3rd party methods
- Data gap filling
- Protocol documentation – compatibility with other monitoring agencies

EO Sensors – supporting near real time monitoring

- Inland and coastal
- Rivers, dams, lakes
- Many use cases
- High spatial resolution
- High spectral resolution
- Frequent revisit
- Hyperspectral
- Very high SN



CSIRO

None of the existing sensors meet all of AquaWatch's needs

Instrument	Revisit time	GSD (m)	Spectral bands	Spectral range (nm)	SNR	Bandwidth/ spectral sampling (nm)	Status	Launch date	EOL date
AquaSat-1	5*	18	109 (TBC)	350 to 1050	>400 (TBC)	6.8	Study	N/A	N/A
Terra, Aqua MODIS	1**	1800	36	405 to 2135	516 to 1087	10 to 15	Operational (extended)	1999, 2002	2023, 2023
SeaWiFS	21	120	8	412 to 865	149 to 487	20 to 40	Operational (extended)	2018	2023
ISS HISUI	2 to 60	30	185	400 to 2500	450	10	Operational (extended)	2019	2023
Landsat 8 OLI	16	30	9	440 to 1370	50 to 130	20 to 180	Operational (extended)	2013	2021
Landsat 9 OLI-2	16	30	9	440 to 1370	50 to 130	20 to 180	Operational (nominal)	2021	2026
Sentinel-2 A/B MSI	5**	10, 20, 60	13	442 to 2186	89 to 168	19 to 184	Operational (nominal)	2015, 2017	2025, 2027
Sentinel-3 A/B OLCI	<2**	300	21	400 to 1020	707 to 2188	7.5 to 15	Operational (nominal)	2016, 2018	2026, 2028
Suomi NPP, JPSS 1/2 VIIRS	<1	750	22	412 to 1200	199 to 414	15 to 39	Operational (nominal), Commissioning	2011, 2017, 2022	2026, 2027, 2028
HySIS	9	30	200	400 to 2400	?	10	Operational (nominal)	2018	2023
PRISMA	29	30	249	420 to 2500	200	10	Operational (nominal)	2019	2024
ISS DESIS	3	30	225	400 to 1000	150	3.55	Operational (nominal)	2018	2023
ISS EMIT	5***	30 to 80	286	380 to 2500	150 to 200	7.1	Commissioning	2022	2023
EnMAP	27, 4*	30	244	420 to 2450	400	6.5	Commissioning	2022	2026
ISS CLARREO Pathfinder	?	500	650	350 to 2300	?	3	Approved	2023	2024
Carbon Mapper (Tanager) 1, 2	1 to 7**	30	600	400 to 2500	300 to 600	5	Approved	2023	2026
PACE OCI	2	1000	106	350 to 890	>1000	5	Approved	2024	2027
Sentinel-2 C/D MSI	5**	10, 20, 60	13	442 to 2186	89 to 168	19 to 184	Approved	2024, 2028	2034, 2038
Sentinel-3 C/D OLCI	<2**	300	21	400 to 1020	707 to 2188	7.5 to 15	Approved	2024, 2028	2028, 2038
TRUTHS	61	50 to 100	346	320 to 2400	?	4 to 8	Approved	2026	2034
FLEX	27	300	430	500 to 1020	175 to 1025	0.1 to 2	Approved	2025	2028
GUMIR	<1***	300	141	340 to 1040	?	5	Approved	2026	2030
SHALOM	6*	8	275	400 to 2500	200	8	Planned	2025	2030
CyanoSat	7	50	300	500 to 780	80 to 120	12 to 13	Planned	2023	2023
Sabia-MAR-1	2	800	16	412 to 1610	600 to 1000	7.5 to 20	Planned	2024	2029
JPSS 2/3 VIIRS	<1	750	22	412 to 1200	199 to 414	15 to 39	Planned	2026, 2031	2033, 2038
SBG	16	30	230	400 to 2500	250	10	Planned	2028	2031
Sentinel CHIME A/B	12**	30	210	400 to 2500	505 to 2188	10	Planned	2028, 2030	2036, 2038
Landsat Next DU	6**	10 to 60	21	410 to 2260	100 to 530	20 to 125	Planned	2030	2035

* Revisit time with 30 deg cross-track slew, ** Combined revisit time for constellation, *** Select geography only

Meets or exceeds requirements

Partially meets requirements

Not suitable

Jet Propulsion Laboratory
California Institute of Technology

EO Sensors – supporting near real time monitoring (continued)

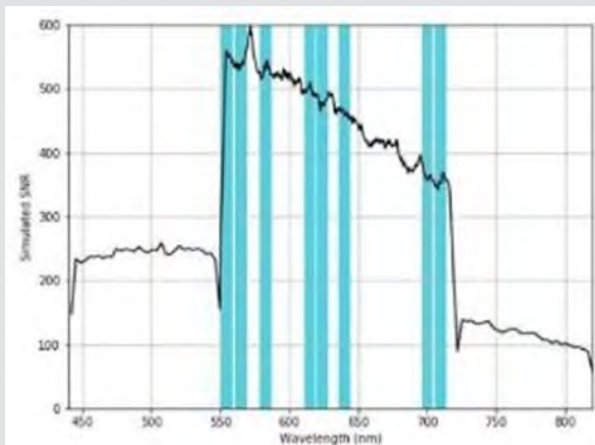
- Cyanosat: A compact hyperspectral Earth observation sensor for AquaWatch
- Prototype payload expected to launch mid 2023



Advanced Manufacturing



Advanced On-Board Image Processing

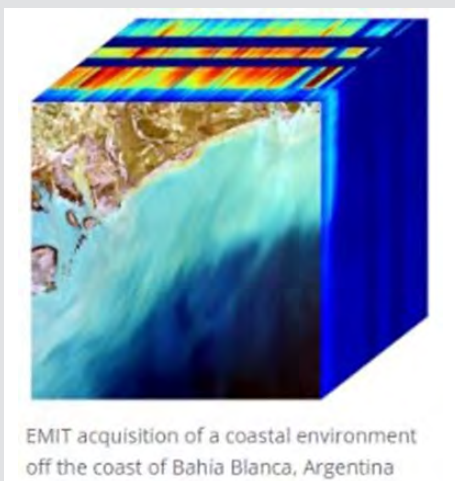


High Signal to Noise Ratio in critical bands



EMIT – Adaptation for AquaWatch

- Preliminary Discussions
- CSIRO/JPL
- Western Water Applications Office (WWAO)
- Reduced spectral range for water
- Dwell for SN



EMIT acquisition of a coastal environment off the coast of Bahia Blanca, Argentina

F-number	F/1.8
Cross-track FO	11°
IFOV (cross-track x along-track)	155 x 71 μ rad
Focal length	193.5 mm
Entrance pupil aperture	110 mm
Spectral Range	380 – 2500 nm
Spectral Sampling	7.4 nm
Number of bands	286
Pixel spacing	60 m



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Menindee Lakes (March 2023 Planet Data)



10 March,
green water
release



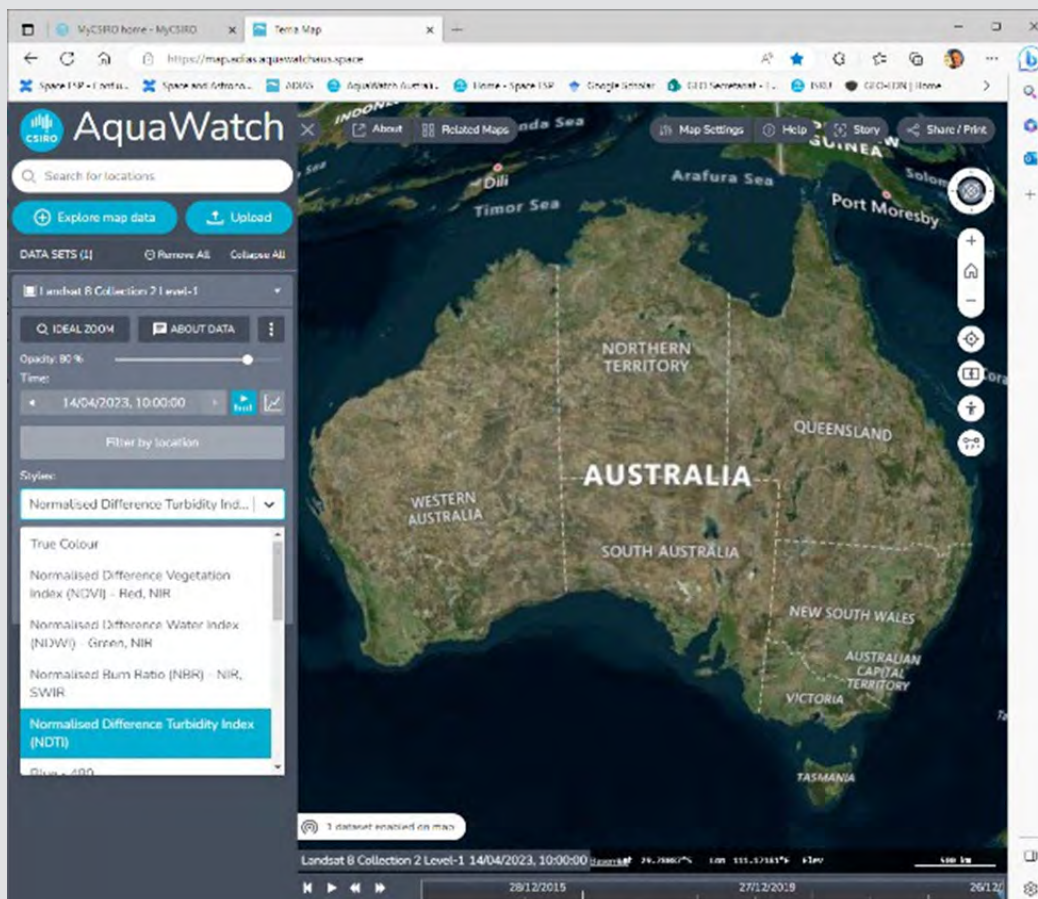
14/15 March, green
water release,
patches of dead fish



18 March, fish rafts near Menindee town

ADIAS

- AquaWatch Data Integration & Analytics System
- Based on Earth Analytics Science and Innovation (EASI) platform technology (<https://research.csiro.au/cceo/>)



Forecasting

- Prevailing and predicted conditions
- Water quality, Temperature, Hydrology, Coastal Currents, Others....
- Algal bloom Lake Hume 2016
- Need to observe the land and coastal sector
- Land use and management, surface conditions (organic loads)
- Radar – floods, plastics, ghost nets?
- Use cases:
 - Algal blooms – cyanotoxins, taste and odour
 - Blackwater – low oxygen, fish kills
 - Flood plumes – sediment load, heavy metals
 - Water quality in regional, un-monitored areas



Implementation

2021 – System co-design and user needs assessment

22 March 2023 – Mission Launch and start of implementation

2026 – System fully integrated across pilot site network (~15 sites) using existing commercial EO data

2028 – Integrate Cyanosat and Australian EO satellites

2030 – 50-100+ research, validation, industry & commercial sites in operation globally

Ongoing

- Partnership development
- Establish Community of Practice (CoP) – GEO AquaWatch?
- In-situ and EO sensor improvement, cost reduction and miniaturisation

Future

- Support advanced ecosystem monitoring



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