



QUEENSLAND
WATER
MODELLING
NETWORK

EXTERNAL ENGAGEMENT PROGRAM

*Extension Report
May 2021*



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1. INTRODUCTION

In June 2018 the [Queensland Water Modelling Network](#) commissioned a consortium to develop and deliver a program of activities to help build the capacity of water modelling and user expertise in Queensland, facilitate engagement across the full range of actors in the Queensland water-modelling ecosystem, and stimulate innovation in all aspects of water modelling and use. This program of activities was termed the [External Engagement Program](#) or EEP and the consortium engaged by the QWMN to deliver the EEP included the IWC (consortium lead, originally a Griffith owned Pty Ltd and now formally part of Griffith University), Griffith University Australian Rivers Institute, University of Queensland, Queensland University of Technology, University of Southern Queensland, the Australian Institute of Marine Science (AIMS), Chris Carroll, and QCIF (whose work was ultimately not funded and so have played only a minor role).

The EEP formally ended on 28 February 2021 after an extension period which increased its lifespan from 2 years (to June 2020) to 2 years and 9 months. The aim of this report is to document and critically reflect on the work of the EEP in terms of activities completed during the extension period, outputs produced and to a limited extent, outcomes achieved.

This report will not provide a systematic evaluation of the outcomes and impacts of the EEP since inception. For that, the interested reader is directed towards the November 2020 QWMN EEP Monitoring and Evaluation Report.

The QWMN Capacity Development Small Grants Scheme was contractually separate from the EEP extension but was managed by the same team at IWC and so is reported on here to provide a single, easy to access critical reflection on the totality of the work done by the EEP from June 2020 (the period of the extension). For fuller details on the work of the Small Grants Scheme and to read reports on the projects funded with small grants the interested reader is directed towards the separate Small Grants Scheme report dated April 2021.

2. EXTERNAL ENGAGEMENT PROGRAM STRUCTURE AND FUNCTION

The EEP was established with the following vision and mission:

Vision: For QLD to be recognised as an international leader in innovation and use of water models and modelling

Mission: To build the capacity of the QLD water modelling and use sector to produce innovative water models and modelling solutions that effectively address complex water policy, planning and management issues

Figure 1 below shows the sector scale capacity building model that underpins and links the activities of the EEP.

Lawrence and Riches (2017)¹ and QWMN (2017)² state that the broad aim of building the capacity of the QLD water modelling and use sector is to achieve higher and sustained rates of innovation and use of models and modelling for the range of water policy, planning and management issues faced in the State. The end result should be that water models and modelling solutions are more useful for practical purposes, more widely trusted and accepted by stakeholders as a basis for decision-making, that new models and modelling approaches are successfully researched, developed and implemented within QLD and that the capabilities which underpin the capacity to innovate and use models and develop modelling solutions are built, renewed and maintained over time. This capacity building definition and aim means that the EEP, across its activities, is focussed on building capacity at a sector scale to innovate in QLD both in terms of product (water models) and process (how models are used to inform water policy, planning and management decision making).

¹ Lawrence, P. and Riches, J. (2017), Advancing Water Modelling through Networks and Engagement, 22nd International Congress on Modelling and Simulation, Hobart, Tasmania, Australia, 3 to 8 December 2017 <http://mssanz.org.au/modsim2017>.

² QWMN (2017), Technical Forum Summary Report 14-15 November 2017, Queensland Water Modelling Network, Queensland Government.

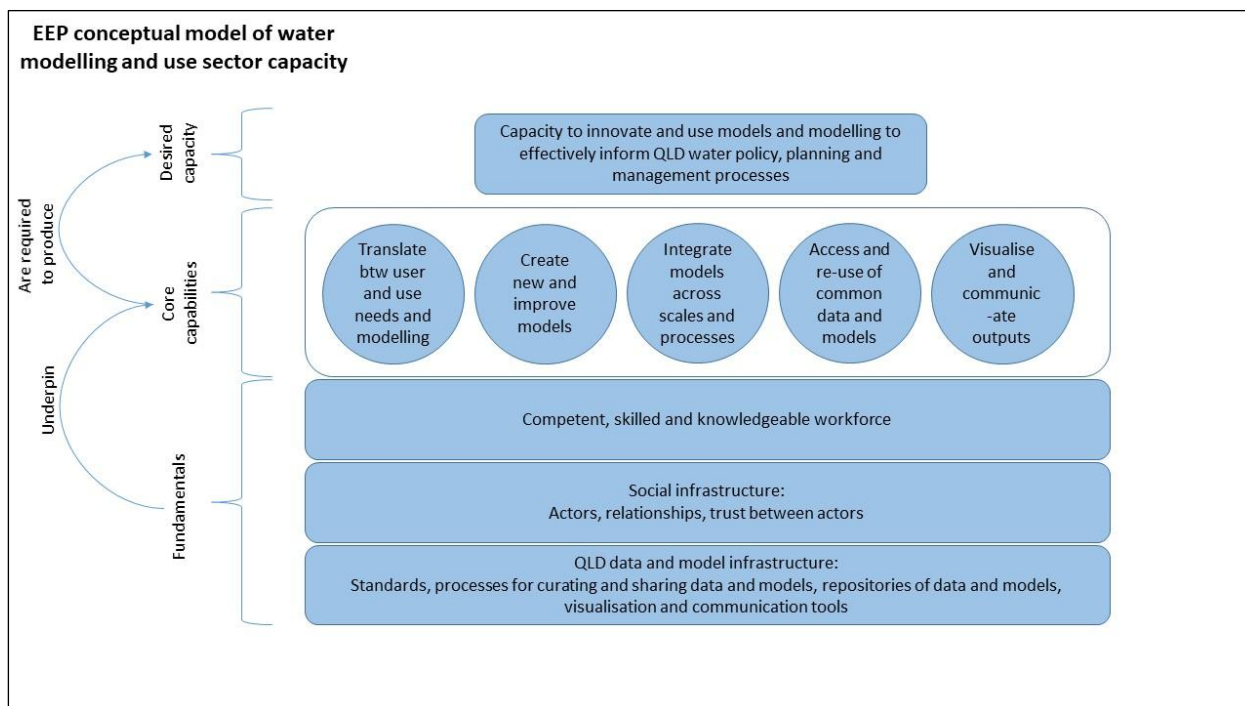


FIGURE 1 REGIONAL SECTORAL MODEL OF CAPACITY BUILDING FOR THE QLD WATER MODELLING AND USE SECTOR

Each of the activities of the EEP were focussed on building all or some of the fundamentals and core capabilities shown in Figure 1 for the purpose of developing the desired capacity – to produce innovative water models and modelling solutions that effectively address complex water policy, planning and management issues.

Figure 2 below shows the structure of the EEP in terms of activities organised into three components – the Hub which focusses on management and co-ordination activities, ERT which focusses on education, training and research activities, CoP which is a set of community of practice engagement activities and INF which is designed to focus on data and model infrastructure building activities but which was not funded. More information on the program activities can be found here - <https://www.des.qld.gov.au/science/pdf/qwmn-external-engagement-program.pdf>.

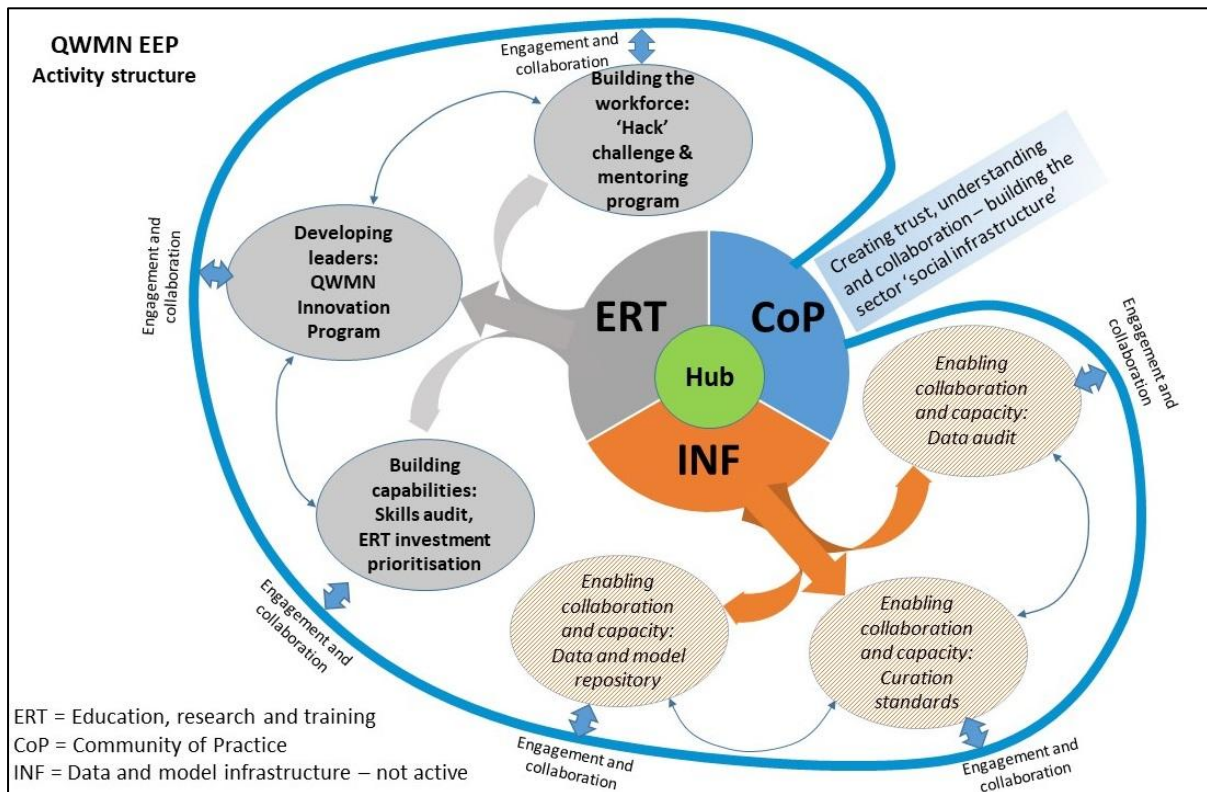


FIGURE 2 QWMN EXTERNAL ENGAGEMENT PROGRAM STRUCTURE (NOTE THAT THE INF COMPONENT WAS NOT FUNDED OR INITIATED)

The EEP extension and Small Grants Scheme involved activities spread across the following components:

- Hub – management and communication services were provided including continuing to host and maintain the content and functioning of the www.watermodelling.org website and monthly newsletters designed to both provide news and to draw readers to the website.
- ERT – the small grants program was designed and administered to provide modest capability and capacity building projects sufficient funding to operate, and in addition
- CoP – a range of CoP events were designed and run in online, face to face and hybrid modes of delivery

These activities will be reported upon across the following sections.

3. HUB COMPONENT ACTIVITIES

During the extension the Hub component provided a set of planning, management and co-ordination functions internally to the EEP, ensuring that all of the activities across all of the components functioned properly. The Hub also provided externally focussed communication activities:

- **Website** – the design, updating and hosting of an external to government, QWMN website – www.watermodelling.org
- **Newsletter** – the production of a monthly newsletter to promote events, activities and outputs of the QWMN, EEP and more broadly from across the sector
- **Social media** – the use of LinkedIn primarily to promote events, activities and outputs of the QWMN, EEP and more broadly from across the sector

The website and newsletter were contractually specified elements of the work of the EEP extension and will be examined in turn.

3.1 WEBSITE

The external QWMN www.watermodelling.org website went live on 19/09/19 after a longer than anticipated design, review, authorisation and build process. Since then (until 1/03/21) the usage has been as shown in Table 1. All metrics have improved since the M&E report in November 2020.

# of users	# of sessions	# page views	# sessions / user	Engagement rate*
6114	8895	18,449	2.07	34.51% (57.33% AU only)

TABLE 1 QWMN EXTERNAL WEBSITE USAGE DATA (* ENGAGEMENT RATE IS THE % OF VISITS THAT INCLUDE INTERACTION WITH ONE OR MORE WEBPAGES - IT IS THE INVERSE OF BOUNCE RATE)

The external QWMN website has reached a global audience as shown in figure 3 below.

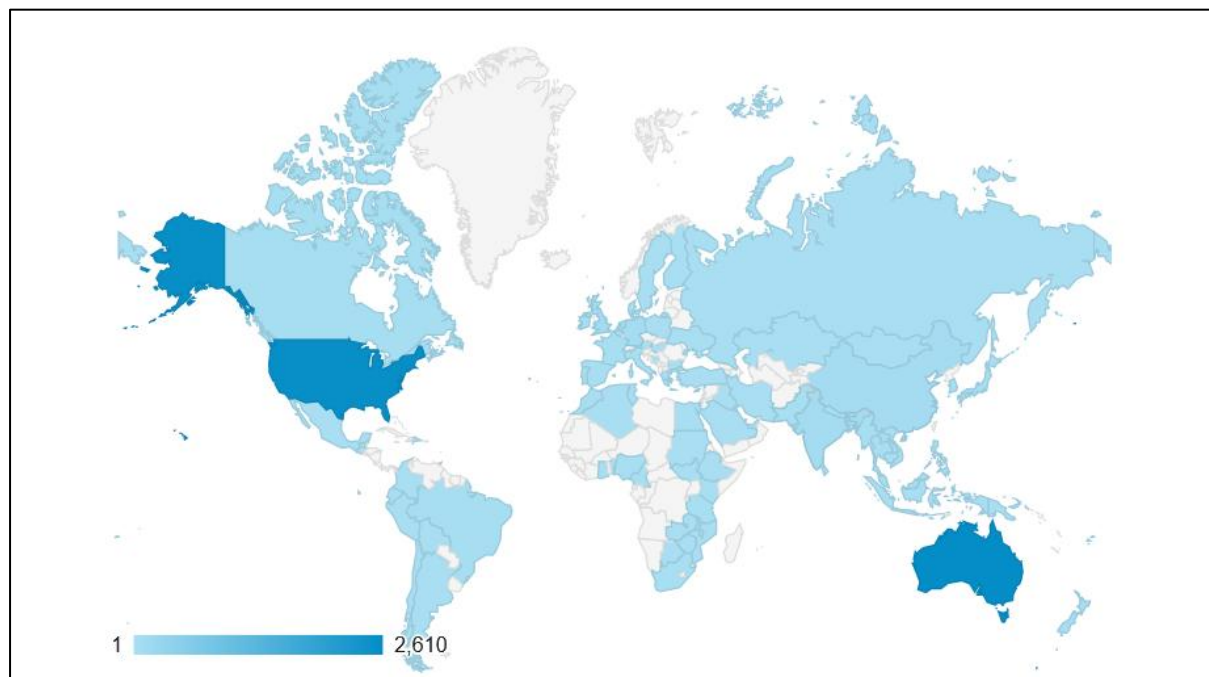


FIGURE 3 QWMN EXTERNAL WEBSITE USAGE GEOGRAPHY (COLOUR INDICATES NUMBER OF USERS AS PER THE EMBEDDED SCALE)

The majority of users are from the US and Australia, although in total users from 87 different countries have accessed the www.watermodelling.org website. The majority of sessions are from Australian users. The usage statistics for the top ten countries by number of users are shown below in Table 2.

Country	# of users	% of users	# sessions	% of sessions
Australia	2610	42.82%	5210	58.57%
US	2544	41.74%	2558	28.76%
UK	90	1.48%	98	1.10%
India	86	1.41%	117	1.32%
China	82	1.35%	82	0.92%
Germany	60	0.98%	66	0.74%
Netherlands	48	0.79%	53	0.60%
Canada	47	0.77%	56	0.63%
Brazil	41	0.67%	63	0.71%
Malaysia	34	0.56%	41	0.46%

TABLE 2 QWMN EXTERNAL WEBSITE USAGE GEOGRAPHY STATISTICS FOR THE TOP TEN COUNTRIES BY NUMBER OF USERS

In addition to the www.watermodelling.org website the EEP have been using Eventbrite to handle event registrations and payments, both for small CoP and larger Forum events. This has worked well and when an event is promoted via a page on the external QWMN website there is a link within the article that takes interested parties to an Eventbrite page to register and (where required) pay.

3.2 NEWSLETTERS

Following the launch of the www.watermodelling.org website a series of monthly newsletters have been designed and sent from a dedicated QWMN Campaign Monitor account set up by the IWC on behalf of the EEP for this purpose.

Month	# of recipients	# opens	% open rate	% click rate
October 2019	446	133	30.3%	21.8%
November 2019	594	209	35.74%	31.58%
February 2020	470	153	33.05%	33.99%
June 2020	697	198	28.7%	25.25%
July 2020	1117	367	33.36%	33.79%
August 2020	1140	343	30.68%	29.74%
September 2020	1129	304	27.26%	30.92%
November 2020	1123	338	30.29%	26.33%
December 2020	1120	286	25.91%	14.69%
February 2021	1110	283	25.63%	31.45%
Averages	895	261	30.1%	27.6%

TABLE 3 QWMN MONTHLY NEWSLETTER DISTRIBUTION AND ENGAGEMENT STATISTICS (OPEN RATE INDICATES THE % OF RECIPIENTS WHO OPEN AND READ THE NEWSLETTERS, AND CLICK RATE IS THE % OF RECIPIENTS WHO INTERACT BY CLICKING ON A LINK)

The statistics show that the number of recipients of, and subscribers to, the QWMN newsletter has grown by about 2.5 times since the launch of the www.watermodelling.org website, and sending regular newsletters and has stayed roughly static since the beginning of the Extension.

The number of newsletter-opens has grown over time but is variable month to month as there are many factors which influence email opening rates – day and time sent-and-received, the level of other emails received by each recipient. The percentage open rate and percentage click rate have stayed relatively stable, varying month to month within the range of 25-33% during the Extension except in December 2020 which is a holiday month in Australia and where open and click rates dropped, likely because fewer people were opening emails. The average across all industries for open rates based on research conducted by email software company [mailchimp](https://mailchimp.com) was 21% so QWMN newsletters are performing strongly compared to other mass emails in terms of audience engagement.

3.3 CRITICAL REFLECTION

The Hub component has functioned well over the course of the Extension. Management needs were relatively low compared to when the EEP started as the Extension essentially kept the EEP running rather than starting new activities. Flexibility in terms of newsletter content and the ability to take a light-hearted but informative tone to the provision of technical news has worked well in terms of maintaining above industry performance levels of open and click rates. Collaborating with the QWMN Secretariat to obtain news items either on QWMN funded projects or State Government work has reduced the workload associated with producing newsletters. Maintaining a steady stream of interesting and engaging content, whilst not a challenge, requires some effort.

Recommendations for going forward:

- Seek new ways to grow the total mailing list size (perhaps across state boundaries) and readership for the website and newsletters.
- Invest more time in rapidly communicating the outcomes of events (e.g., CoP events) as a mechanism for driving engagement.
- Grow the source and variety of content within newsletters and the website to provide a more complete offering to support the capacity of the water modelling and use sector in Queensland.

4. EDUCATION, RESEARCH AND TRAINING (ERT) COMPONENT ACTIVITIES

The ERT component during the EEP extension provided a diverse range of activities all designed in different ways to enhance the development of the water modelling workforce in Queensland:

- **Mentoring program** – an upper level undergraduate and young water professional focussed skills based mentoring program providing training in how to set up, run and analyse catchment models using SOURCE as a platform
- **Skills and Knowledge Audit, Response Report and QWMN Capacity Development Small Grants Scheme** – an audit of the key skills, knowledge and workforce development and maintenance issues facing the Queensland water modelling and use sector, followed up by a Response Report which identified the key capacity and workforce challenges facing the sector within Queensland along with a range of potential responses to addressing them, and finally a small grants scheme designed to award a set of grants ranging from \$5000 to \$10,000 from a total fund of \$50,000 to help realise solutions to these challenges
- **The QWMN Innovation Program** – an industry focussed doctoral program based on the UK Industrial Doctorate Centre Model

This section will go through these activities in turn.

4.1 MENTORING PROGRAM

Over several decades a vast amount of tacit knowledge and experience has been built up within the Queensland modelling community, particularly in Queensland Government departments, in the use of water models to provide support for: land-holder decision making; agricultural systems assessments; water planning decision making; framing catchment and groundwater policy making; and for coastal water quality reporting.

The Queensland Government created the QWMN to identify and address strategic research and development opportunities and challenges, and to foster Queensland's next generation of water modellers. The QWMN Mentoring Program has facilitated a process that links experienced modellers with early career water modellers. Essentially to 'unlock' the institutional modelling tacit knowledge (know how) to support and inspire the next generation of Queensland modellers.

In Phase 1 (pre-Extension) of the QWMN Mentoring Program students from five Queensland universities (Griffith, JCU, USQ, QUT, UQ) and young professional within the Queensland Department of Natural Resources. Mines and Energy were engaged; with 30 of the next generation of modellers undertaking the program.

In the QWMN Mentoring Program Extension year the Universities of Central Queensland and the Sunshine Coast were initially approached to be engaged in the Mentoring Program. However, during 2020, covid-19 had a major impact on all universities and Dr Yeboa Gysasi-Agyei at Central Queensland University retired which left no lecturer to champion the Mentoring Program. Instead, students from Griffith University and University of Southern Queensland were approached to be part of the transition year, along with a young professional from QDNRME who joined the program through the QWMN Newsletter.

The QWMN Mentoring Program was a skills-based mentoring program that focussed on students learning how to use SOURCE catchment modelling from eWater training materials (stage 1 of the program) then how to apply SOURCE to address a real-world water modelling question through professional mentoring (stage 2). A total of 39 mentees have progressed through the program with 33 of them completing both stages. Tables 4 and 5 below show how this breaks down.

Group	Number of mentees	Type of mentees
Griffith University	4	Undergraduate students
University of Queensland	4	Undergraduate students
University of Southern Queensland	7 (incl. 3 who only did stage 1)	Undergraduate students
Queensland University of Technology	3	Undergraduate students
James Cook University	7	Undergraduate students
DNRME	5	Young professionals

TABLE 4 QWMN MENTORING PROGRAM STATISTICS (PRE-EEP EXTENSION)

Group	Number of mentees	Type of mentees
Griffith University	1	Undergraduate students
University of Sunshine Coast	3	Undergraduate students
	3	Staff (incl. 1 observer)
University of Southern Queensland	1	Undergraduate students
DNRME	1	Young professionals

TABLE 5 QWMN MENTORING PROGRAM STATISTICS (EEP EXTENSION)

Mentors during the Extension were drawn from DNRME and eWater, including David Waters, Juanita Moolman and Geoff Davies. Prior to the Extension other mentors were involved. See previous Mentoring Program reports for details.

The following comments were provided by participants on completion of the QWMN Mentoring Program:

Thank you for providing this opportunity, particularly for our students. I think it has been very worthwhile for them, and me...I am now investigating the use of Source for reservoir modelling' (Helen Fairweather, Lecturer USC).

'My original background is mainly in reservoir simulation for oil and gas studies but during this training I realised that many of the activities/processes in surface water modelling using Source software are quite similar to those in reservoir simulation such as history match, predictions, sensitivity analyses and optimization' (Laureano Gonzalez Rodriguez, PhD student USC).

Thank you for the opportunity to undertake this course, it was very informative for me as a professional in a different field and wanting to gain insight into the environmental engineering

sector, but more importantly it has been helpful to me as an environmental engineering student' (Aaron Bulfin, USQ).

'Thank you very much for your support throughout the QWMN Program. I enjoyed learning how to use Source software and about the current issues facing the GBR very much' (Janet Forster, Griffith University).

'I would like to thank you all for the valuable learning experience this QWMN Mentoring Program has been. I will use Source in future research projects. I would also be keen to discuss the use of constructed floating wetlands as farm filters in the GBRC' (Luke Verstraten, Lecturer USC).

4.2 QWMN CAPACITY DEVELOPMENT SMALL GRANTS SCHEME

In 2019 the EEP completed and published a Skills and Knowledge Audit based on structured interviews with 22 senior managers from a range of different water modelling employers including Federal agencies, state government, local government, water utilities, universities and consulting firms. A further six contextual interviews were conducted across universities, consulting firms and a water utility to provide supporting information.

The Skills and Knowledge Audit was then interrogated by a panel of thirteen members drawn from the QWMN Secretariat, the EEP, professional bodies (e.g., Australian Water Association, Engineers Australia), consultancy firms, universities, local government and from DES generally). This Panel developed a Response Report which identified the highest priority skills, knowledge and broader workforce challenges facing employers across the sector from the Audit, and then went further by identifying a range of possible responses to each challenge – what could be done and potentially, by whom (which kind of organisation).

Both the Audit Report and Response Report were published and led to the development of the QWMN Capacity Development Small Grants Scheme which, following a covid-19 delay, opened for applications in June 2020 at the start of the extension. A set of four grants were chosen in July 2020, started work across the period from late July to early December and have all now completed their work, these were:

- 'Workshops on Evaluating and Communicating Model Performance' – Kate O'Brien (UQ) and Matthew Adams (QUT)
- 'Uncertain futures website: Decision making in the face of multiple plausible futures' - Joseph Guillaume, Tony Weber, Caroline Rosello, Holger Maier, Sondoss El Sawah, Tony Jakeman, Lorrae van Kerkhoff (ANU)
- 'Developing best practice guidelines for lake modelling to inform quantitative microbial risk assessment (QMRA)' - Songyan Yu (Griffith), Katrin Sturm (SEQwater), Badin Gibbes (UQ), David Hamilton (Griffith), Mark Kennard (Griffith), Cameron Veal (SEQwater), Duncan Middleton (SEQwater), Paul Fisher (SEQwater), Simon Rotherham (SEQwater)
- 'A Water Sensitive Approach to Norman Creek' – Chris Tanner (CRCWSC) plus collaborators from BCC

Final reports for the first three small grants are attached as an appendix to this report. The fourth small grant was awarded to help support a workshop to bring together stakeholders to look, using water modelling tools, at how to redesign Norman Creek. This workshop was only partially successful – it was recognised that more data and analysis was required to be able to robustly assess different water sensitive options for the restoration of Norman Creek and its catchment. Also it was recognised that the case study options being evaluated needed to be presented to and discussed with the relevant senior managers from Brisbane City Council. To provide more time for the additional data gathering and analysis, and to fix a date in the diary of multiple (8+) senior BCC managers, that a follow up workshop would be convened. That workshop was scheduled on 21st April and then rescheduled for 14th May to accommodate all the diaries of the participants. It is expected that a final report will be furnished shortly afterwards.

4.3 QWMN INNOVATION PROGRAM

The QWMN EEP established an Australian first, an applied, industry-focussed water modelling doctoral training program, called the QWMN [Innovation Program](#). A set of five projects were selected from an initial pool of 25 potential industry and government proposals that were generated through an EOI process, and then five high performing PhD candidates were recruited to become the inaugural cohort of [Innovation Associates](#). These Associates are currently undertaking projects to inform the work of BoM, Queensland Hydrology, Gold Coast Council, SEQwater and C20 Consulting / AIMS. Three out of the five have been confirmed with one of the remaining two to be confirmed shortly. The final candidate has had his confirmation denied and put onto an MPhil pathway but is appealing the decision currently. One of the 5 has already been published in both a journal and through a major conference.

During the Extension the EEP acted to continue to support the Innovation Associates through regular quarterly catch up meetings, through the provision of training including scripting in R, and helping the Associates be aware of and articulate the value proposition of the research they are conducting. Funding for further Innovation Associates was pursued through the CRC program but unfortunately did not come to fruition within the context of the Extension.

4.4 CRITICAL REFLECTIONS

The Mentoring Program continued successfully despite the significant challenges presented by the impacts and restrictions of covid on the higher education sector where redundancies occurred, and where students were disrupted. The continued financial (in terms of free licences and access to SOURCE expertise) support of eWater provided a significant part of the foundation to the program. The other parts of the foundation to the program were the deep networks and expertise provided by Chris Carroll, the Mentoring Program and the mentoring offered by Dave Waters within DNRME.

The challenges and opportunities going forward are:

- To take advantage of the significant private sector experience in a range of water modelling platforms that exists and diversify the base of mentors.

- To not become dependent on a network of academics across universities to champion and support the program but rather to take a whole of Queensland approach to the mentoring program so that it recruits from all Queensland universities, has scale and is able to grow a network of enthused young pre-professionals eager to learn and enter the sector workforce.

The QWMN Capacity Building Small Grants program has achieved significant impact for approximately \$35,000 of awarded small grants. In terms of leverage the Program generated just over \$83,000 of in-kind funding, enabling QWMN/DES to secure a leverage ratio of ~2.4. The QMRA project has generated useful industry ready insights and outputs. The uncertainty website grant has created the start of a website that will be added to become a useful resource for this aspect of water modelling. The model performance and communication workshop series grant was highly effective at engaging and upskilling participants in this area of practice. Finally, the Norman Creek grant enabled participants in a broader research project to come together, and to make significant progress towards developing case study material

Lessons have been learned from the process of marketing, awarding and managing Small Grants:

- covid impacts delayed the launch of the Small Grants program meaning only 1.5 months were available to attract applicants. A longer period would be preferable going forward.
- Despite this the leverage value and outputs of the Small Grants indicate strongly that this is a quantum of funding which, if targeted to the right projects, can generate momentum, and provide a useful lever in a number of ways to build capacity.
- Where grants are awarded to run workshops (such as with the UQ/QUT grant) these need to be advertised and participants recruited. Doing this whilst although also trying to run and attract participants to take part in CoP events requires some delicate balancing – there is only so much appetite for events and so timing and clarity of messaging need to be managed to avoid flooding the market. Running events online does expand the market though and can be used as a way to maximise audience and impact.
- Awarding Small Grants is best done for stand-alone or independent activities with more manageable scopes and processes. The Norman Creek grant funded part of an activity within a broader, and reasonably complex research initiative. Consequently, the impact of that funding has only been partially realised at the time of writing. The full value will be realised later in April after some additional work is completed.
- Contracting can take time and some awardees were not able to start until contracts were in place which challenged the overall timeline for the Grants program. This was further compounded by the IWC EEP contract novation process, which was an unforeseen one-off event as IWC was transitioned in to become part of Griffith.

5. COMMUNITY OF PRACTICE (CoP) COMPONENT

5.1 OVERVIEW

The 3rd component of the EEP was the Community of Practice (CoP) component. Communities of Practice – CoPs – are processes for promoting and catalysing learning and innovation across professionals and organisations. In a CoP, novices and experienced practitioners can learn from observing, asking questions, and participating alongside others with more or different experience, in sharing practices and knowledge, and in determining what should be done collectively.

Specifically, the QWMN CoP was initiated and has been cultivated over the lifetime of the EEP to assist with the overall capacity building aims of the EEP and QWMN by:

- Providing an opportunity for a diverse breadth of modelling and user stakeholders to participate in events and activities that deepen their collective awareness and understanding of issues and potential pathways for model improvement
- Strengthening the process of collaboration in a learning and sharing setting, that can then continue in joint efforts in specific projects
- Enjoying smart use of time and resources by having events and activities scheduled at times that compliment other project development and collaboration needs
- Involving the entire value chain of participants in the water sector – from model development, through to deployment and utility, onto influencing planning and management practices on ground, as well those assessing subsequent impacts – in the various events and activities in a shared safe learning space.

The QWMN CoP has been a series of events participated in by members – some online (particularly since covid-19 started), some face to face, some small (20 or 30 people) and some large (~140 at a QWMN Forum and in excess of that at some CoP events). There is no formal membership structure or process, rather, participants simply turn up and participate. Some participants are active coming to all or most events and/or playing an organising role, some participants are occasional coming to some events, and some participants are peripheral, only having come to one or two events.

The tables below (numbered 6, 7 and 8) show the CoP events which have been designed and delivered both pre-covid-19 (table 6) and post covid-19 (tables 7 and 8), and how participation at those events breaks down.

The largest participation in terms of % of participants across all the CoP were participants from the private sector (27.6% of participants), followed by participants from research (25%) and from State Government (17.9%). The tables (6-8) above provide the complete breakdown.

Employer type	Forum 2018	Career event 2019	Urban water event 2019	Catchment event 2019	Climate impacts event 2019	Deagon event 2019	Climate data event 2019	Forum 2020	Average % across events 2018-2020
Private Sector	28	53	25	25	28	33	19	16	27.6
Research	25	10	10	13	14	7	15	26	25.0
Local Govt	3	1	15	8	4	2	2	5	4.2
State Govt	22	8	20	17	23	35	15	19	17.9
Fed Govt	2	0	0	4	1	0	0	3	2.0
NRM	2	0	5	8	1	0	4	1	2.4
Water Utility	8	10	15	4	15	0	19	10	10.6
Education	10	18	10	21	14	24	26	20	13.9
Total registered participants	108	78	20	22	90	46	54	137	

TABLE 6 QWMN EEP CoP EVENT ENGAGEMENT PROFILE PRE-COVID (% OF ATTENDEES AT EACH EVENT BY EMPLOYER TYPE – NOTE, THAT RESEARCH INCLUDES HIGHER EDUCATION AND INDEPENDENT OR GOVERNMENT RESEARCH, WHILST EDUCATION MEANS PARTICIPANTS IN EDUCATION I.E. STUDENTS)(DATA: EEP)

Employer type	Climate change impacts May 2020	Remote sensing May 2020	Multiple plausible futures June 2020	Remote sensing June 2020	Demystifying flood models August 2020*	DPPU October 2020**	Average % across events 2018-2020
Private Sector	37	20	28	35	39	41	27.6
Research	26	32	30	23	24	39	25.0
Local Govt	3	2	6	1	8	0	4.2
State Govt	19	33	13	24	11	0	17.9
Fed Govt	0	1	0	9	0	0	2.0
NRM	1	4	1	0	0	2	2.4
Water Utility	9	3	15	2	3	2	10.6
Education	6	6	7	7	15	16	13.9
Total registered participants	168	152	137	230	66	44	

TABLE 7 QWMN EEP CoP EVENT ENGAGEMENT PROFILE SINCE COVID PART 1 (% OF ATTENDEES AT EACH EVENT BY EMPLOYER TYPE – NOTE, THAT RESEARCH INCLUDES HIGHER EDUCATION AND INDEPENDENT OR GOVERNMENT RESEARCH, WHILST EDUCATION MEANS PARTICIPANTS IN EDUCATION I.E. STUDENTS, * THIS EVENT WAS HYBRID FACE TO FACE-ONLINE, ** THIS EVENT WAS FACE TO FACE ONLY) (DATA: EEP)

Employer type	Evaluating the performance of water models October 2020	Uncertainty is the only certainty November 2020	Building economics into water modelling November 2020	Communicating model performance for decision making November 2020	Young Water Professionals - Navigating the future December 2020	Average % across events 2018-2020
Private Sector	17	12	30	16	23	27.6
Research	24	39	19	49	50	25.0
Local Govt	0	2	3	2	5	4.2
State Govt	28	10	16	7	2	17.9
Fed Govt	2	2	0	0	0	2.0
NRM	2	0	3	2	0	2.4
Water Utility	28	16	19	21	2	10.6
Education	0	18	11	3	18	13.9
Total registered participants	58	49	37	61	44	

TABLE 8 QWMN EEP CoP EVENT ENGAGEMENT PROFILE SINCE COVID PART 2 (% OF ATTENDEES AT EACH EVENT BY EMPLOYER TYPE – NOTE, THAT RESEARCH INCLUDES HIGHER EDUCATION AND INDEPENDENT OR GOVERNMENT RESEARCH, WHILST EDUCATION MEANS PARTICIPANTS IN EDUCATION I.E. STUDENTS, * THIS EVENT WAS HYBRID FACE TO FACE-ONLINE, ** THIS EVENT WAS FACE TO FACE ONLY) (DATA: EEP)

5.2 CRITICAL REFLECTIONS AND FORWARD PLAN

The CoP component of the EEP and its extension has clearly worked if one views the numbers of participants and takes an ‘activation’ view of CoP success – has the CoP managed to activate and mobilise the community of water modelling and use practitioners across the sector in Queensland? Yes, and beyond, is the answer.

There is a clear core of regular participants some of whom who have been active in running events. Then an active set who participate frequently then a set of broader participants who drop in for some events and finally, a set of lurking participants who sign up, don’t participate live but do receive event recordings (for online events). This final set have not been analysed carefully to date. Having different kinds of participants with different participation rates is normal for a CoP.

There is no national equivalent to the QWMN CoP even within the established practitioner societies like [MSSANZ](#) (Modelling and Simulation Society of Australia and New Zealand) and [iEMSs](#) (International Environmental Modelling and Software Society) so the CoP has filled a gap nationally as well as within the State and to a lesser but still notable extent, internationally. This augurs well for the continued momentum needed to keep a CoP alive – sector practitioners are looking for the kinds of opportunities offered by CoP events to exchange knowledge, learn and connect. The quote below from a CoP participant illustrates this well.

“You shook up the landscape in modelling. Everyone was doing their own thing, then you came along, and suddenly everyone came out of their shells and started meeting, talking, sharing.” (QWMN CoP participant)

The EEP M&E report provides a more detailed assessment of the QWMN CoP from an outcome and impact perspective.

From a practical perspective:

- Research and education (university staff and student) participation rates have grown over the course of the EEP which is good, creating an exposure and connection mechanism which might foster research as well as workforce growth
- Engaging state government employees to participate takes 2-4 weeks of lead in time to ensure necessary approvals to attend and pay event fees and to take the time can be secured.
- covid forced the CoP online which had the side benefit of increasingly accessibility to and participation rates from regional areas, a feature which would be good to retain in the future.
- Running hybrid events with both face to face and online modes simultaneously is very challenging – best to choose a format for an event and then stick with it. On balance a mix of event modes over time, bearing in mind the note about regional participation above.
- Identifying practitioner champions is important to ensure that the events and activities are really driven by and meet practitioner needs.
- Treating one of the Small Grants (Model performance and communication workshops) as a form of CoP event was a good idea – it enabled those workshops to be advertised within the broader suite of CoP activities rather than being treated as something separate. This avoided there being too many events being run (small grants + CoP) which would have diluted the audience.

Going forward the key challenges and opportunities for the QWMN CoP are:

- To ensure a continued, varied, sector driven agenda of events that are well designed and engaging.
- To provide a more specific overall strategic purpose in terms of capability and capacity building to the CoP whilst respecting the need to allow events to be organically programmed and to evolve according to champion volunteers and sector interests.
- To monitor the outcomes and impacts of CoP events – this is challenging as there are many participants and many ways that CoP events can have an effect, immediately and over following months.
- To develop ways to take the outputs and interest from CoP events and turn them into practical opportunities for action.

The forward plan for CoP activities, after the conclusion of the EEP Extension, was to firstly do three things:

1. Decide through stakeholder and network participant discussion upon the thematic focal areas for work – to select 3 water modelling pipelines that align with QWMN RD&I priorities.
2. To run a series of short workshops to identify key issues in each thematic focal area.
3. And to then develop a detailed month by month

In addition to this process based forward plan there will be a young professional event held within the first 6 months of 2021 (so by end June 2021) to follow on from the success of the event held on career planning with young professionals in December 2020.

6. CHECKLIST OF DELIVERABLES

Table 9 below provides a summary of the deliverables that were due under the original EEP contract and the EEP Extension contracts.

Contract	Deliverable	Status
EEP	EEP Strategic and Governance Plan	Delivered
	Communication and Engagement Concept Note	Delivered
	Communication and Engagement Plan	
	Program Implementation Plan incl M&E Framework	Delivered
	ToR for Skills and Knowledge Audit	Delivered
	Sector Priorities Report	Was agreed to be rescoped – see Year 1 Milestone Report
	Website Development and Delivery	Delivered
	Draft Skills and Knowledge Audit Report	Delivered
	Final Skills and Knowledge Audit Report	Delivered
	2018 Technical Forum Organisation and Delivery	Delivered
	CoP Program and Event Delivery Year 1	Delivered
	Hack Challenge Event Design and Delivery	Delivered
	2019 Technical Forum Organisation and Delivery	Was agreed to be moved to early 2020 - delivered
	CoP Program and Event Delivery Year 1	Delivered
	Future Investment Priorities Report	Delivered
Extension	Monthly Newsletters (June 2020 to February 2021)	Delivered except for October 2020 (agreed not to issue due to election) and January 2021(holiday time so no news or audience)
	Mentoring Program Report	Delivered
	EEP Extensions Report	Delivered (this report)

TABLE 9 QWMN EEP AND EXTENSION CONTRACT DELIVERABLES

7. SUMMARY OF EXTERNAL ENGAGEMENT PROGRAM LIFETIME ACHIEVEMENTS

Including and in addition to the contracted deliverables the EEP has achieved a number of outputs and outcomes. In summary, over the course of 33 months since inception the EEP has:

- Contributed to better understanding and developing the water modelling and use sector workforce in QLD through having:
 - Developed and run a water modelling mentoring program which has seen 39 mentees from Griffith, UQ, USQ, QUT, USC and JCU as well as 6 DNRME employees being mentored by experienced DNRME modellers in the skills required to use eWater SOURCE for practical hydrological analyses of catchments.
 - Established an Australian first - an applied, industry focussed water modelling doctoral training program called the QWMN Innovation Program. A set of five projects were selected from an initial pool of 25 potential industry and government

proposals that were generated through an EOI process, and then five high performing PhD candidates were recruited to become the inaugural cohort of Innovation Associates. These Associates are undertaking projects to inform the work of BoM, Queensland Hydrology, Gold Coast Council, SEQwater and C20 Consulting / AIMS.

- Produced a world first sector wide job role specific capability analysis of the water modelling and use workforce in QLD - the Skills and Knowledge Audit and a follow-up call to action and detailed analysis report to address gaps identified by the Audit - the Response Report – and finally a Small Grants Program to turn the Response recommendations into action.
- Developed and ran the first Queensland Water Modelling Hack Challenge which attracted 20 aspiring junior to mid-career water modelling professionals to compete in an open innovation style hack challenge focused on water-landscapes-energy in QLD. The winning team came from SEQwater and the event itself attracted significant industry and government support.
- Developed a Sector Pulse Check report from the QWMN Forum 2020 to characterise sector composition, to highlight issues, needs and opportunities.
- Brought state and local government, water utilities, consulting firms, software companies, researchers and students from across the water modelling and use sector together to engage and learn from one another through:
 - Running a series of successful Community of Practice events across 2019 and 2020 including events focussing on career development for YWPs, an urban liveability event, a landscape restoration event, a critical review of climate change science event, a physical modelling event (tour of Deagon), a skills and knowledge audit response consultation event and both face to face and online climate change data and modelling events, two remote sensing and water modelling events, a flood modelling event, a decision making and uncertainty event and a water management device to modelling event. These events have created a wide range of outcomes and impacts which have enhanced the function and connectedness of the sector to a significant extent.
 - Running two significant two-day Forum events each attracting over 115 participants from across Queensland and inter-state to showcase Queensland and other water modelling and use sector talent, and to engage participants in learning across research and practice, and policy, planning and management areas.
 - Growing engagement across the Queensland water modelling and use sector in the activities of the QWMN by 861% since June 2018 (as measured by size of email list) and achieved significant diversification of engagement from largely Queensland Government participants to a mix of private sector (largest single

group), state government and research (about equal participation rates across these two groups), education, utilities, local government, NRM and federal government.

- Developing the concept of the water modelling pipeline which was used to structure the QWMN Forum 2020 and which is now being used by practitioners to articulate what they do and where gaps and opportunities lie for improving the design and use/usefulness of water models e.g. at the QWMN funded Strategic Review of Models.
- Built a set of communication mechanisms to articulate and project the work of the QWMN and more broadly the sector through having:
 - Grown the QWMN contact list by 861% since the EEP began in June 2018.
 - Developed a new external website to represent, project and profile the QWMN and the broader water modelling and use sector in Queensland - www.watermodelling.org - which has been viewed over 15,000 times by over 5000 users from 80 different countries.
 - Developed a monthly email newsletter sent out to inform the Queensland water modelling and use sector of news, events, resources and QWMN projects and to draw readers to the website.
- Contributed to developing strategic partnerships and developing momentum towards a national platform for improving water modelling and use through having:
 - Developed a strategic relationship with the NSW sister program to the QWMN, the NSW Monitoring and Modelling Hub (MaMH) including hosting their first ever Forum in Sydney in 2019.
 - Ran a MODSIM 2019 session on 'Collaborative Approaches and Arrangements for Improving Water Models and Modelling' that was in the top ten in terms of number of presentations out of 70 sessions - with 14 paper presentations and ending in a workshop that has resulted in a group of 25 participants from across Australia who are planning to write a positioning / review paper on the topic to both establish the state of the art and to inform subsequent action in relation to using collaborative approaches and arrangements to improve water models and modelling.
- Generated \$818,404 of leverage funding for the QWMN - \$240,000 in terms of free SOURCE licenses to mentees on the Mentoring Program, approximately \$475,000 from the universities who have provided scholarships to the 5 Innovation Associates, \$83,404 in cash and in-kind contributions provided by the QWMN Small Grants winners and \$20,000 in Hack prize money.

8. FURTHER INFORMATION

For further information please contact the QWMN External Engagement Program Manager, A/Prof. Brian S. McIntosh at b.mcintosh@griffith.edu.au