



WONDER OF SCIENCE

2021 ANNUAL REPORT



PROMOTING A STEM CULTURE

WELCOME

2021 - The announcement of Professor Ian Frazer AC, FRS, FAA, MB ChB (Edin), MD (Melb) as WoS Patron was just one of the highlights as we celebrated a ten-year milestone!

Almost 6000 students participated in Wonder of Science (WoS) school programs and 800 of those attended one of the 12 regional student conferences across the year. We then welcomed ~100 of them back to UQ for State Conference in late November along with teachers, parents and special guests. 140 WoS cupcakes were baked for the big day and enjoyed by all attendees prior to the announcement of this year's State Champions, with regional as well as metropolitan schools in the honours line-up – full details on page 6.

The Queensland Chief Scientist, Professor Hugh Possingham attended the Flying Scientists' mid-year induction program and then touched down with the team in Emerald for one of our most successful regional Flying Scientist events ever, as locals welcomed our scientists, and Dr Christina Zdenek's star Woma python, Netflix – more about that and all the Flying Scientist events on pages 20-21.

Despite some COVID hiccups and subsequent postponements across the year, we announced long-serving Ambassador, David Sutton from QUT as the inaugural Gordon Dunlop Medal recipient at the annual WoS Ambassador Celebration event in October. Special guests joined the Young Science Ambassadors for canapés and drinks at the UQ Centre for the celebration – see pages 10-11.

I hope you enjoy reading the report – and the team looks forward to working with you as we head into another year supporting STEM in Queensland schools.

ROBYN BULL
DIRECTOR
WONDER OF SCIENCE



WONDER OF SCIENCE
PROMOTING A STEM CULTURE

Kimberley Park State School students - Logan Regional Conference

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PROMOTING A STEM CULTURE

WHERE STUDENTS UNDERSTAND THE IMPORTANCE OF STEM AND

BELIEVE THAT STEM EDUCATION AND CAREERS ARE ACCESSIBLE TO THEM

“A renewed national focus on STEM in school education is critical to ensuring that all young Australians are equipped with the necessary STEM skills and knowledge that they will need to succeed.”

National STEM School Education Strategy, 2015

THE WONDER OF SCIENCE APPROACH

- Promotes problem-solving skills, including critical, creative, collaborative and ethical thinking
- Develops the student capabilities required to achieve and succeed in a rapidly advancing and changing world
- Develops deep understanding of STEM concepts in students
- Supports teacher capability for quality STEM teaching and learning

STEM INQUIRY TASKS

STEM INQUIRY - CHALLENGING, REAL-WORLD TASKS ALIGNED TO THE AUSTRALIAN CURRICULUM

- The Wonder of Science challenge tasks immerse students in authentic and collaborative inquiry
- Students develop critical and creative thinking skills as they are challenged to develop a group response to a real-world problem or scenario

YOUNG SCIENCE AMBASSADORS



YOUNG SCIENCE AMBASSADORS - INSPIRATIONAL PhD RESEARCH STUDENTS ARE PASSIONATE AND KNOWLEDGEABLE STEM ROLE MODELS

- The Young Science Ambassadors support implementation of Wonder of Science, and judge presentations at the student conferences
- Teachers describe them as “bringing STEM to life” in their schools

STUDENT CONFERENCES



STUDENT CONFERENCES - ASPIRATIONAL REGIONAL AND STATE LEVEL STUDENT SHOWCASE EVENTS

- Representative teams from participating schools are invited to present their challenge task response at a one-day regional student conference
- Winning teams receive medals and a trophy for their school and are then invited to State Conference held at a university campus each year

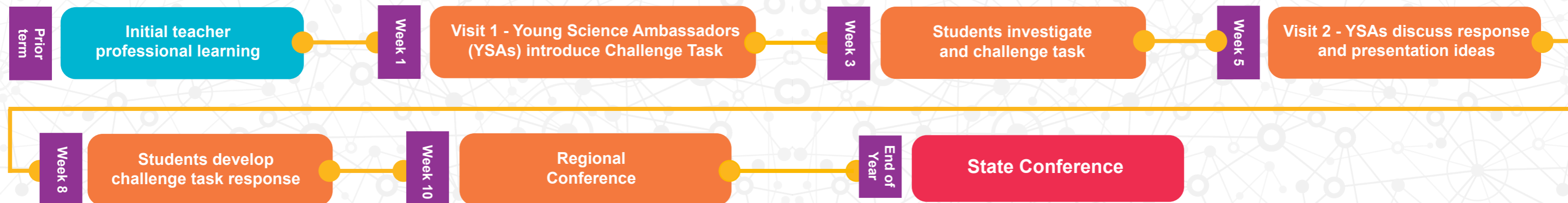
PARTNERSHIPS



STRATEGIC PARTNERSHIPS - BETWEEN SCHOOLS, UNIVERSITIES, INDUSTRY GROUPS, NON-PROFIT ORGANISATIONS & GOVERNMENT AGENCIES

- Wonder of Science fosters partnerships between schools and the wider community through our partner organisations
- Our partners support the student conferences and other STEM experiences for participating schools

TYPICAL TIMELINE FOR SCHOOL ENGAGEMENT WITH WONDER OF SCIENCE

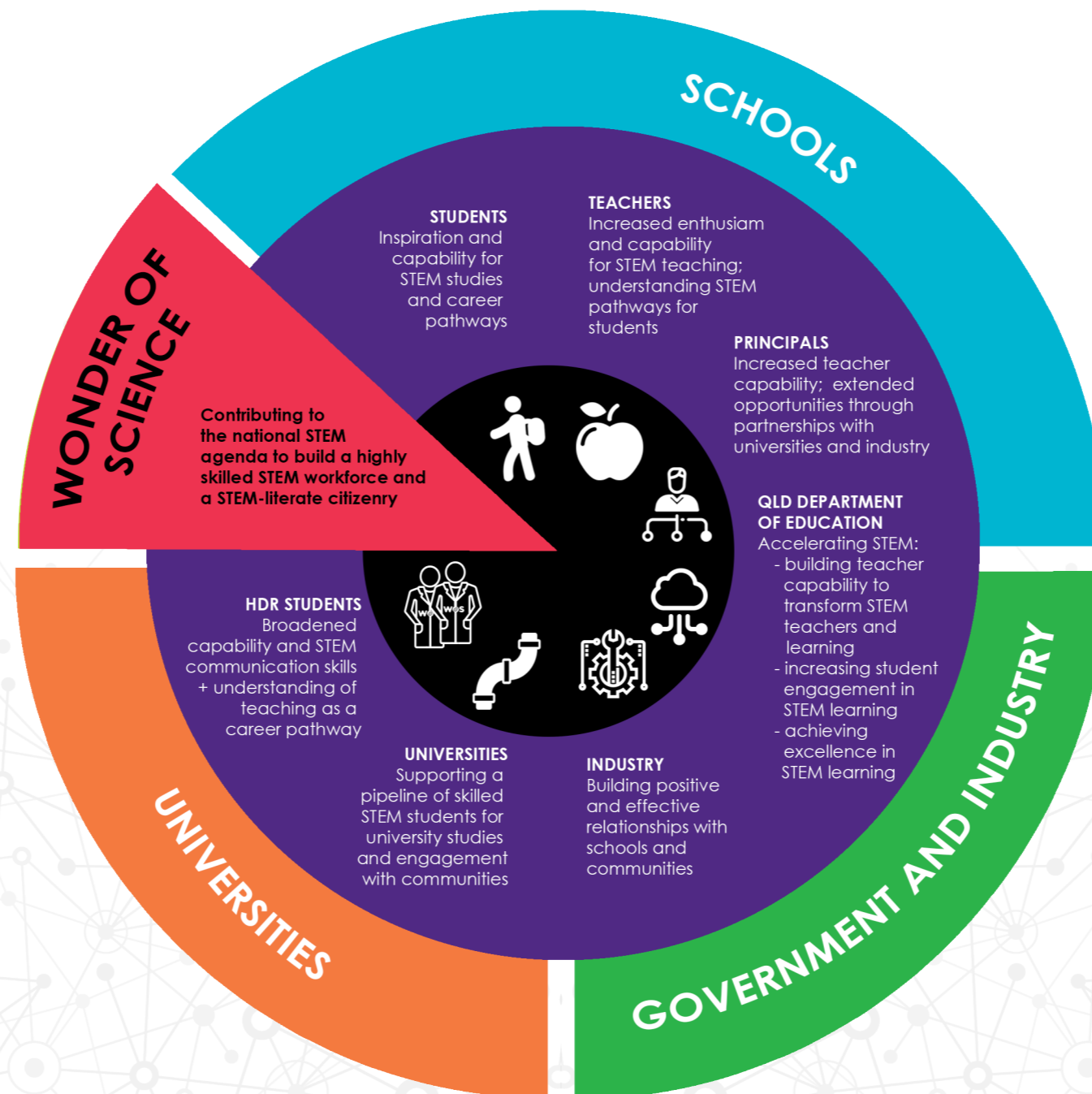


THE WONDER OF SCIENCE™ ADVANTAGE

IN-PERSON PROGRAM

The in-person program fee is \$3500 per school (for up to 6 classes) for a term – less than \$25 per student

- 1 Professional learning options for teachers: STEM Inquiry – the WoS approach
- 2 WoS challenge tasks, teacher unit overview, lesson plans, criteria sheets, investigation planners and Young Science Ambassador video lessons
- 3 Two ambassador visits (in-person) during the term
- 4 Attendance at a regional student conference for a representative team from each class with trophy and medals for winning teams
- 5 Attendance at State Conference for all regional winning teams and their teachers
- 6 Extended opportunities for students through our strategic partnerships – for example, university programs and QTFN's Camp Koala and Avoid Island programs



VIRTUAL PROGRAM

The virtual program fee is \$2500 per school (for up to 6 classes) for a term – less than \$17 per student

- 1 Professional learning options for teachers: STEM Inquiry – the WoS approach
- 2 WoS challenge tasks, teacher unit overview, lesson plans, criteria sheets, investigation planners and Young Science Ambassador video lessons
- 3 Two virtual ambassador visits during the term via video conferencing
- 4 Participation in a regional student conference via video conference for a representative team from each class with trophy and medals for winning teams
- 5 Participation in State Conference via video conference for all regional winning teams and their teachers

Michelle Cummings
Head of Science
Peace Lutheran College

"Such a fantastic experience (and we're not just saying that because we had some success). The open-ended nature of the task and the depth to which students could take their work made the project awesome for our top-end students. Also, they were super inspired to visit the JCU and UQ campuses and are already talking about "when they go to uni". Brilliant. Thank you again, we'll be back next year and I would recommend it to anyone who enquired about the programme."

2021 IMPACT

1962

additional students reached via other STEM activities - e.g. the Flying Scientists Program

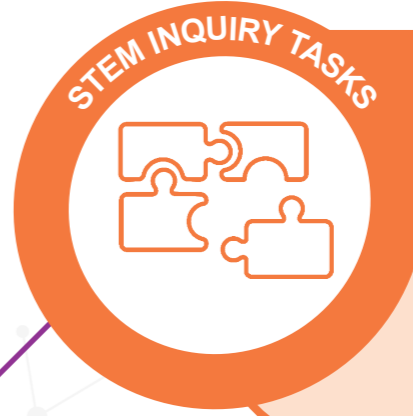


129

students attended State Conference

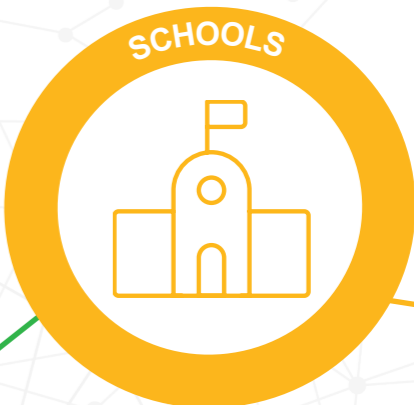
This year Wonder of Science reached **12943 people** including students, teachers, parents and community members

789 students attended a regional conference



STUDENTS IMPACTED THROUGH SCHOOL OR VIRTUAL VISITS

5786



117 Young Science Ambassadors

64% of Young Science Ambassadors are female

58 schools from regional, remote and metropolitan Queensland

44 are state schools

100700

Impressions on the Wonder of Science Twitter account

57% of participating schools are rated below the average socio-education advantage (ICSEA)¹

275 Teachers reached

¹www.myschool.edu.au (2021)

STATE CONFERENCE 2021 CHAMPION TEAMS

Year 4 - Stretton State College

Year 5 - Stretton State College

Year 6 - Meandarra State School

Year 7 - Peace Lutheran College

Year 8 - Spinifex State College and Stretton State College

Year 9 - Peace Lutheran College



YOUNG SCIENCE AMBASSADORS™

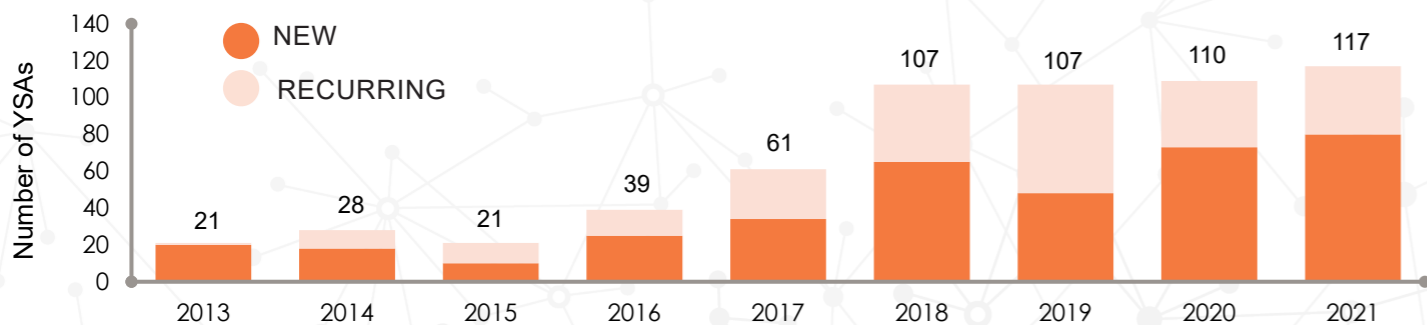
68% of 2020 Young Science Ambassadors continued in 2021

YOUNG SCIENCE AMBASSADORS

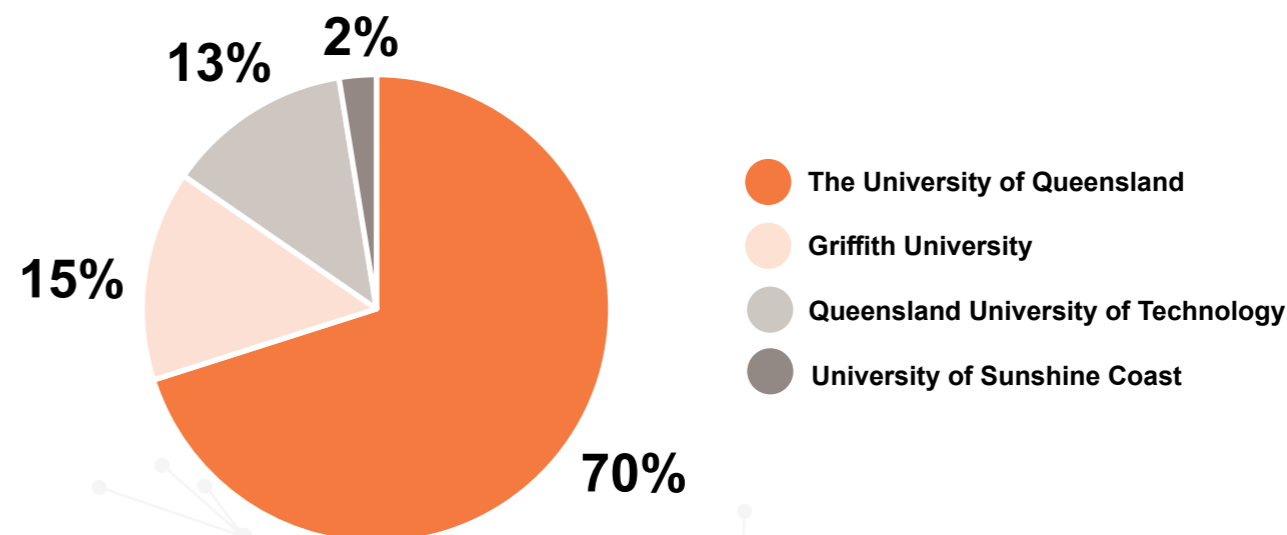
The Young Science Ambassador program has reciprocal benefits: it provides enthusiastic and inspirational STEM role models for students and teachers in schools; and it enriches the experience of the postgraduate students in the program - with many demonstrating enhanced science communication skills and workforce preparedness, as well as aptitude for teaching - as per Athena Stein's comment below.

41% of Young Science Ambassadors have participated for 2 or more years

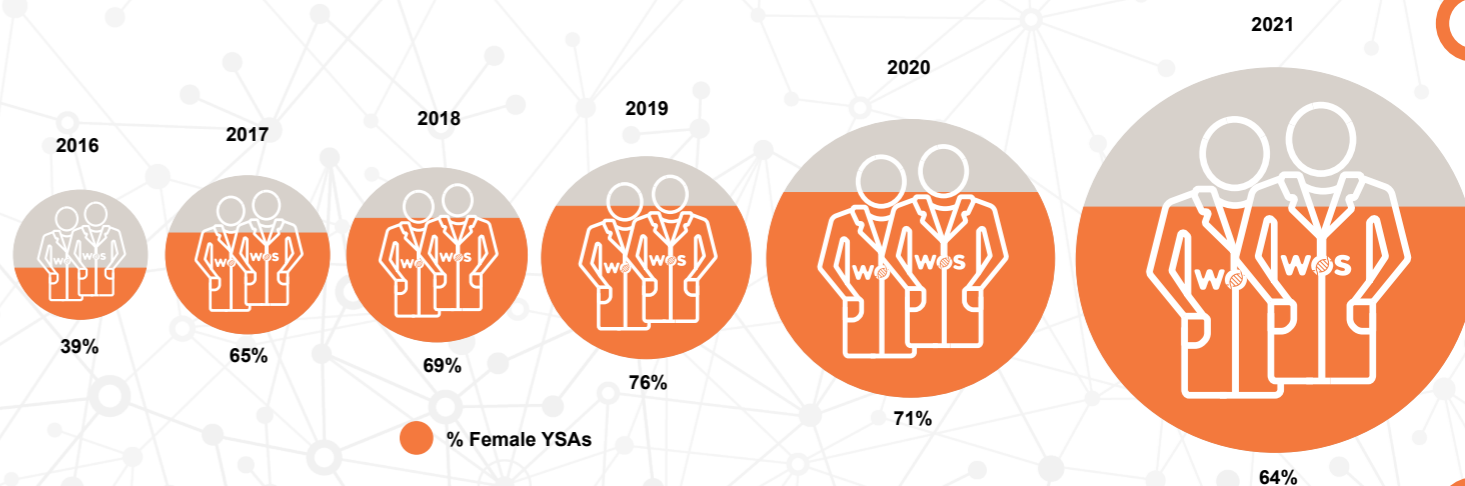
YSA RETENTION



INSTITUTION BREAKDOWN



GENDER BREAKDOWN



Athena Stein
Young Science Ambassador
The University of Queensland



"I just wanted to let you know that this week I received FHEA accreditation (Fellowship of the Higher Education Academy). I am extremely thrilled and wanted to say thank you as I really feel that my experiences with WoS so far have really helped to build that support of teaching and learning. WoS has also helped me to build a teaching philosophy, and added to my passion for teaching!"

Tania Welfare
Digital Technologies Teacher
Roma State College

"I wanted to let you know that [the Young Science Ambassadors] did an amazing job with their WoS sessions at RSC. The students were engaged and focused. Their sessions were very informative and thought provoking. Our students are definitely feeling more at ease with their challenges."



Young Science Ambassadors - State Conference 2021

CELEBRATING 10 YEARS

The *ATSE WoS Challenge*, as it was originally named, was an innovation of the Queensland division of The Academy of Technology and Engineering (ATSE) piloted in 2012. 15 schools in Townsville and Cairns participated and a research study, conducted by James Cook University indicated the “transformative potential of engaging in science inquiry-based challenges”.¹

Since then Wonder of Science has continued to expand its reach across Queensland to focus on regional, rural and remote schools as well as those in the south-east corner, and in 2021 we celebrated ten years working with Queensland schools.

Over 100 Young Science Ambassadors and special guests, including WoS Patron, Professor Ian Frazer and his wife joined us for drinks and canapés for the first of the celebrations. A wonderful evening was enjoyed by all and the special announcement of the inaugural *ATSE Gordon Dunlop Medal* just topped it off! More on that on p.11.

The celebrations then continued with 140 guests, including students, teachers, parents and partner representatives joining us for State Conference (pp 14-15) in late November. In addition to the usual student presentations and workshops everyone enjoyed a yummy WoS cupcake at morning tea and our Chief Scientist, Professor Hugh Possingham popped in to speak with and respond to student questions. It was a great day and testimony to the WoS ten year journey.



CELEBRATING 10 YEARS

YSA Celebration Event 2021



¹Tomas, Louisa, Jackson, Cliff, and Carlisle, Karen (2013) *The transformative potential of engaging in science inquiry and design-based challenges: the ATSE Wonder of Science Challenge*. In: *Proceedings of the Annual conference of the Australian Science Education Research Association*. p. 45. From: 44th Annual ASERA Conference, 2-5 July, 2013, Wellington, New Zealand.



AwwWoSome Awardees:
Young Science Ambassadors
awarded for exceptional
service in 2021

GORDON DUNLOP MEDAL

The announcement and presentation of the Gordon Dunlop Medal, was a very special part of the YSA celebration and the WoS ten year celebrations. The medal was dedicated to the late Emeritus Professor Gordon Dunlop who was a great champion for WoS and a truly ‘WONDER-full’ man. Professor Dunlop was a Fellow of The Academy of Technology and Engineering and he spearheaded the Queensland division’s support for WoS until his sad passing in 2015.

The medal acknowledged the outstanding contribution of an Ambassador to WoS and STEM education, and was awarded to David Sutton from QUT who has been in the Ambassador program for several years. He is photographed here receiving his medal from Gordon’s wife, Professor Halina Rubinsztein-Dunlop AO FAA and Dr David Noon, Chair - ATSE Queensland division.



YSA Celebration Event: Speed Meet Session



FNQ Regional Conference



Miles Regional Conference



Fizzy Chemistry Workshop:
Dalby Regional Conference



Young Science Ambassadors:
Mount Isa



G-STEM:
Up and Atom
Event



CoralWatch:
Metro Secondary
Regional Conference



World Science Festival
Gladstone 2021



Gladstone Regional
Conference

Mount Mee State School
students: North Coast
Regional Conference

**PROMOTING
A STEM
CULTURE IN
QUEENSLAND
SCHOOLS**

STUDENT CONFERENCES

789
students attended
a regional
conference

199
teams participated
in a regional
conference

59%
of students that
attended State
Conference were
female

50%
of State Conference
Champions
were female

Having been part of WoS since 2016, it is exciting to see the impact of the conferences increasing each year.

This year WoS convened 12 regional conferences, including a hybrid model with both in-person + virtual modes enabling students who could not physically attend, to participate in the Cairns Regional Conference in October and at our State Conference on Friday, 26 November.

Both students and teachers continue to positively engage with the student showcase conferences - as the evaluation data opposite indicates.

Congratulations to all participating students and to their teachers and parents.



Dr Kaylene Butler
Program Officer
Wonder of Science

- THE 2021 STATE CHAMPION TEAMS**
- Year 4 - Stretton State College
 - Year 5 - Stretton State College
 - Year 6 - Meandarra State School
 - Year 7 - Peace Lutheran College
 - Year 8 - Spinifex State College and Stretton State College
 - Year 9 - Peace Lutheran College



State Conference Year 9 Champions and Ms Rose Wood, Manager STEM, Department of Education

"Congratulations for organising an amazing event. You made us at CSDE feel special and included. Great to see the other schools work and what a bonus to get a special session with Dr Anita Milroy."

Markus Honnef
Head of Department - Science
Cairns School of Distance Education

STUDENT CONFERENCE EVALUATIONS

93%
agree or
strongly agree that
"presenting their team
project at the conference
was a valuable learning
experience".

89%
agree or
strongly agree
that "observing other
team presentations was
interesting and
valuable".

71%
agree or
strongly agree that
"they have a **GREAT**
interest in studying
STEM-related subjects in
Years 11 & 12".

93% agree or strongly agree that participating in the "Wonder of Science conference was an exciting and challenging opportunity".

Dalby Regional Conference - Dalby South State School



OVERALL REACH

2021 WONDER OF SCIENCE STUDENT REACH

Cluster/Region	Funding model ¹		Number of schools	Number of classes	Total students	Conference attendees			
	Funded	Fee				Name	Teachers	Students	
Darling Downs South West	●		13	Year P to 2	1	10	Dalby	4	33
				Year 3/4/5/6	1	11			
				Year 3	1	7			
				Year 4	1	6			
				Year 3/4	1	12			
				Year 5	10	145			
				Year 5/6	3	29			
				Year 6	10	163			
				Year 7	3	40			
				Year 8	3	42			
				Year 9	3	44			
Total	37	509	Total	16	197				
North Coast	●		4	Year 2/3	1	13	Brightwater	5	57
				Year 4/5/6	1	25			
				Year 5	6	163			
				Year 6	6	151			
				Year 7	2	55			
				Year 8	3	80			
				Year 9	2	56			
Total	21	543	Total	5	57				
Metro (South)	●		2	Year 5	1	34	Logan	5	82
				Year 5/6	3	85			
				Year 6	1	34			
				Total	5	153			
Lockyer	●	●	2	Year 7	1	27	Participated in Metro Regional Conferences		
				Year 8	6	177			
				Year 9	1	26			
				Total	8	230			
Metro	●		8	Year 4	1	28	Coomera	2	79
				Year 5	1	28			
				Year 6	9	228	Mansfield	8	40
				Year 7	9	243			
				Year 8	4	68			
				Year 9	19	423	Brisbane	14	113
				Total	43	1018			

Adam Hooper
Head of Department (Teaching and Learning)
Edge Hill State School

"Two of our students are now being interviewed for the Science Academy program at Trinity Bay SHS (for year 7, 2022) due to their participation in WoS."

Cluster/Region	Funding model ¹		Number of schools	Number of classes	Total students	Conference attendees						
	Funded	Fee				Name	Teachers	Students				
Bowen Basin	●		3	Year 4	2	45	Moranbah	1	12			
				Year 5	5	118						
				Year 6	2	51						
				Year 7	7	157						
				Total	16	371				Total	1	12
Far North Queensland	●		10	Year 4/5/6/	1	22	Cairns	11	52			
				Year 4	3	59						
				Year 5	3	51						
				Year 6	7	126						
				Year 7	9	173						
				Year 8	10	228						
				Year 9	17	336						
				Year 10	2	54						
				Total	52	1049				Total	11	52
				Central Queensland	●					13	Year 4/5/6	3
Year 5	9	194										
Year 5/6	2	38										
Year 6	8	187										
Year 7	20	511										
Year 7/8	1	11										
Year 8	8	193										
Year 9	7	161										
Year 9/10	1	11										
Total	59	1382	Total				7	103				
North	●		3	Year 5	3	65	Mount Isa	3	54			
				Year 6	4	75						
				Year 7	8	187						
				Year 8	8	204						
Total	23	531	Total	3	54							
Total in WoS STEM inquiry program			58	264	5786	Conference	72	789				
Additional school visits (Flying Scientists)			6	Years 1 - 12	26	580	N/A					
Additional reach through other STEM activities (Prep - Year 12)			1382			N/A						
Total			64	290	7748	Conference	72	789				

PARTNERSHIPS

STRATEGIC PARTNERSHIPS

WoS fosters school and community partnerships with universities, industry and other STEM agencies

and our partner organisations value-add to the WoS experience for students and teachers.

G-STEM

G-STEM is a WoS partnership with Foxwell State Secondary College that focuses on engaging 'Girls in STEM' studies and career pathways, with WoS providing female Young Science Ambassadors as mentors for the students in the program.

In 2021 ~ 40 years 7 and 8 girls participated in the program to develop an independent research project. The mentors and mentees communicated through virtual as well as face-to-face meetings, with the Foxwell students presenting their projects at an end-of-year 'Up and Atom G-STEM fair'.

The students were also treated to an end of year celebration with the Wonder of Science mentors at The University of Queensland, with special guest lectures from Dr Margaret Wegener (School of Mathematics and Physics) and Professor Halina Rubinsztein-Dunlop AO FAA (Chief Investigator, Director, Translational Research Laboratory).

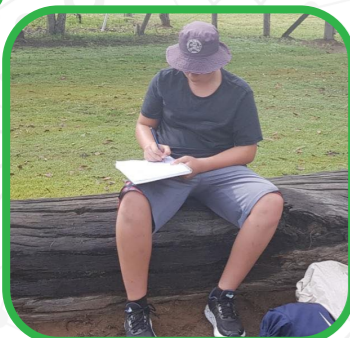
The day concluded with an introduction to micro-drones, where each student learnt how to safely take off, check the drone, fly, safely land and hand over to the next pilot.



G-STEM Year 8 End of Year Celebration

QTFN

QUEENSLAND TRUST FOR NATURE



Students from Daisy Hill State School and Kimberley Park State School participated in a two-day *Koala Camp* experience as part of the WoS partnership with Queensland Trust For Nature. The camp was held at Woodstock at Tamborine with students and teachers staying overnight and enjoying a bonfire and toasted marshmallows to cap off their busy daytime biodiversity investigations.



WONDER OF SCIENCE INAUGURAL PATRON

PROFESSOR IAN FRAZER AC, FRS, FAA, MB CHB (EDIN), MD (MELB)

"I'm really excited to be asked to be Patron of Wonder of Science. The Young Science Ambassador and Flying Scientists programs are a fun way of enhancing Queensland school and community engagement in Science, Technology, Engineering and Mathematics (STEM). The programs will help to inspire the next generation of Queensland scientists, and I'm looking forward to meeting them all!"



As part of the 10-year milestone Wonder of Science was indeed very proud and excited to announce Professor Ian Frazer as our "WONDER-full" Patron. In addition Professor Frazer and Ms Caroline Frazer

through the Frazer Family Foundation will support a WoS program for disadvantaged students and their teachers in 2022.

Several UQ Ambassadors and the WoS Director were invited to lunch with **The Hon Meaghan Scanlan, Minister for the Environment & Great Barrier Reef, Minister for Science & Youth Affairs** when she visited UQ Tuesday 23 November. The Minister was very engaged as the Ambassadors took the opportunity to promote their research as well as WoS and its benefits to them and schools across Queensland. The Flying Scientists program is a partnership with the Office of the Queensland Chief Scientist which sits within Minister Scanlan's portfolio.



FLYING SCIENTISTS

Following a year of almost entirely virtual Flying Scientists events in 2020, it was fantastic to firstly participate as a Flying Scientist at Emerald in March this year, and then to go on to coordinate a broad range of events across the state, as I took on my new role, as part of the WoS team in July.

The Flying Scientists program is truly making regional Queensland communities more aware of our amazing researchers and the excellent work they do right here in our own backyard.



Dr Anita Milroy
Program Officer
Wonder of Science



Associate Professor Michael A. Cowling
Flying Scientist
CQUniversity

"In a year filled with uncertainty, being a Flying Scientist with Wonder of Science and the Office of the Queensland Chief Scientist provided a highlight and some much needed stability, providing me an opportunity to engage with the general public and fellow scientists in a variety of forums. The program is well recognised and well run, and a great way to connect scientists with communities. I look forward to continuing as a Flying Scientist in 2022 and contributing to this great engagement activity."

Dr Cara Wilson
Flying Scientist
CQUniversity

"I really enjoyed the opportunity to head out to Duaringa and participate in a yarnning circle. Not only did I get to share my research projects with the community, but I also found the day very enlightening, and it opened some new doors for me and our projects at CQU. It's not very often that scientists get the opportunity to extend their research beyond the intended target audience, but I believe it is so valuable for everyone involved when science is shared widely."

Duaringa Flying Scientist Event



Dr Grace Muriuki
Flying Scientist
Healthy Land and Water

"My experience was humbling and enlightening. Humbling because even though there is a lot of ground to cover in promoting science and its application in rural and remote areas, so too is the need for learning from there - different understanding, different questions and different meanings of science and its application, especially in First Nations' context."

FLYING SCIENTIST EVENTS

Date	Location	Flying Scientist	Activities	Attendees	Total Attendees
22 - 23 March	Emerald	Dr Anita Milroy, Saba Sinai and Professor Hugh Possingham	Community Events (3)	181	564
			School Visits (2)	383	
22 May	Arlie Beach	Dr Kate Helmstedt	Community Event	36	156
			School Visits (3)	120	
6 - 7 June	Chinchilla	Dr Jenni Gunter	World Science Festival Community Events		1789
29 - 30 August	Gladstone	A/Prof Michael Cowling	World Science Festival Community Events		2636
8 October	Mount Isa	Dr Mariel Familiar Lopez	Community Event	53	163
			School Visit	110	
12 October	Duaringa	Dr Grace Muriuki and Dr Cara Wilson	Community Event		20
6 events	Total National Science Week	11 Scientists	8 Community Events	4715	5328
			6 School Visits	613	

100% agree or strongly agree "the Flying Scientist event was interesting and informative".

100% agree or strongly agree that "more events of these types would be welcome in the community".



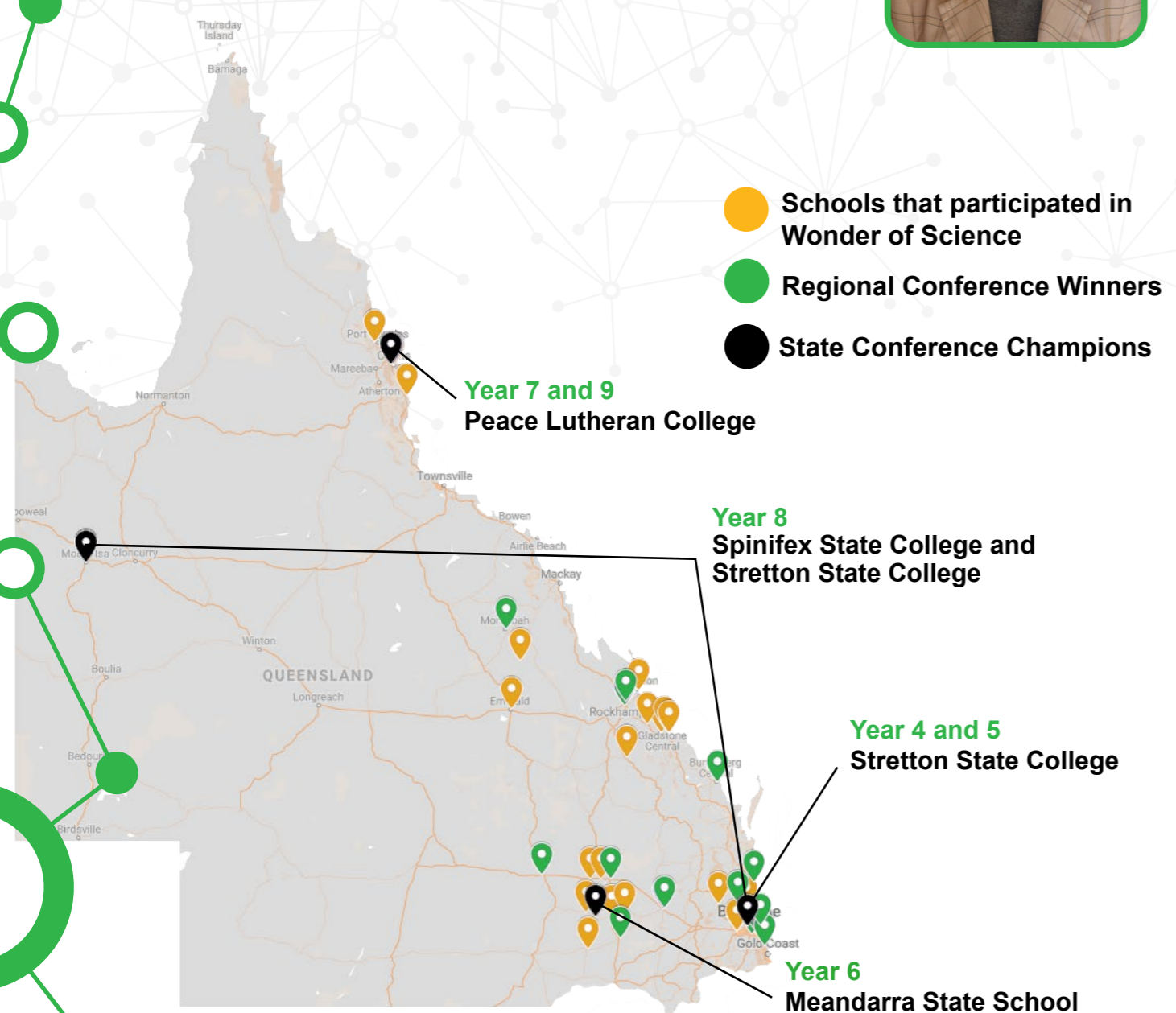
Queensland Chief Scientist Hugh Possingham and Flying Scientists at Emerald State School

SUMMARY

It has been my pleasure as Chair of the WoS Advisory Board to note the achievements of the team and the Young Science Ambassadors in their outreach to Queensland schools and communities in 2021. Strong uptake from schools across the state has been supported by our partner organisations and it was particularly pleasing to see students and teachers from both regional and metropolitan

schools attending the student showcase conferences. In addition, the calibre and number of HDR students in the Young Science Ambassador program and their impact in schools is impressive. UQ and the WoS Advisory Board look forward to continuing the excellent support these passionate young STEM role models offer to schools and communities.

Professor Helen Klaebe
 Dean - UQ Graduate Sschool
 Chair - WoS Advisory Board
 The University of Queensland



FINANCIAL OVERVIEW 2021

Income (\$'000)	
Partner contributions	202
Ambassador funding (all universitie partners)	145
The University of Queensland additional contribution*	115
Qld G'ment Department of Education	150
Qld G'ment Department of Science (Flying Scientists program)	35
School participation fees	75
Total	722
*support for salaries and program delivery	
Expenditure (\$'000)	
Staff salaries	412
Programs delivery cost	76
Young Science Ambassador award payments	110
Total	598
Operating result	124
Committed forward 2022	150
2021 BALANCE	274

Robyn Cowie
 HOD Science
 Cairns State High School

"Cairns SHS has been involved with WoS in some capacity over the last 6 years. As teachers we enjoy having the opportunity to deliver science curriculum as inquiry based learning. Students appreciate taking ownership of the design focus and the analysis of an experiment in a topic of their choosing. Teachers enjoyed students defending their research in a presentation at the culmination of the program. Students find it motivating to connect with young scientists conducting research in the chosen fields."

*The University of Queensland provides additional in-kind support to host Wonder of Science and support the team.

Redlands College students - State Conference 2021



PARTNERS

Wonder of Science would not be possible without our valued partners - thank you to all!



PARTNER WITH US

We welcome organisations, philanthropic foundations, universities, and other STEM agencies as partners.

For further information, please contact Wonder of Science

CONTACT

WONDER OF SCIENCE

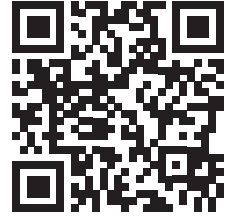
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