PUMICESTONE CATCHMENT CONVERGENCE 2021

EVENT PROGRAM

February 16-18, 2021
University of the Sunshine Coast,
Sippy Downs

SPONSORS

This event is supported by the Australian Government's National Landcare Program delivered by Healthy Land and Water, the Sunshine Coast Council Sustainability Grants delivered by Take Action for Pumicestone Passage (TAPP), and the Moreton Bay Regional Council Community Support Grants delivered by Bribie Island Environment Protection Association.

Many organisations have provided in-kind support,
most particularly the University of the Sunshine Coast.

ORGANISING TEAM

This Convergence is the culmination of a year of discussion between a dedicated group comprised of researchers, community members, Council staff and NRM managers that has gathered over 50 presenters to share their knowledge and passion:

Healthy Land and Water
- Susie Chapman
- Liz Gould
- Dr Grace Muriuka

Take Action for Pumicestone Passage (TAPP)
- Paul Harney
- Ken Mewburn
- Carla Clynick
- Brady Sullivan

Department of Agriculture and Fisheries
- Rachel Abel
- Bill Johnston

Wildlife Preservation Society Qld (WPSQ) Sunshine Coast Branch
- John Roberts

Bribie Island Environment Protection Association (BIEPA)
- Diane Oxenford

Sunshine Coast Council
- Graham Webb
- Peter Armstrong
- Jasmine Russell

Moreton Bay Regional Council
- Jessica Mowat
- Ben McMullen
- Paul McAntee

University of the Sunshine Coast
- Dr Ben Gilby
- Dr Gabriel Conroy
- Professor Claudia Baldwin
- Dr Neil Tindale
- Dr Gareth Chalmers
- Sophia Armstrong

Growcom
- Lene Knudsen

Thanks to all the members of the Pumicestone Region Catchment Coordination Association (PRCCA) for past efforts, and for the use of the logo so your memory lives on.

PUMICESTONE CATCHMENT CONVERGENCE 2021

Insights for a healthy future

February 16-18

University of the Sunshine Coast, Sippy Downs

We acknowledge that the Pumicestone Passage and its catchment encompassing the ancestral Glass House Mountains has been nurtured by the Kabi Kabi and Jinibara Peoples for tens of thousands of years, and that the spiritual, cultural and physical consciousness gained through this custodianship is vital to maintaining the future of this region.

We wish to thank all the generous presenters who have agreed to share their time and wisdom for no recompense, and the many organisations who have sponsored their skilled and knowledgeable staff to present.

PROGRAM

DAY ONE

Tuesday 16th February, 2021

8.30am start

Session 1) Introductions — Susie Chapman, Healthy Land and Water – host

Welcome to Country — Traditional Owner Kabi Kabi, Uncle Gordon Cowburn

Acknowledgment of Country — Traditional Owner Jinibara, Jason Murphy

Welcome to USC — Vice-Chancellor and President Professor Helen Bartlett, University of the Sunshine Coast

Session 2) Traditional Knowledge Projects

Shell midden mapping in Pumicestone — Kerry Jones, Kabi Kabi First Nation and Michael Strong, Turnstone Archaeology

Cultural burning and landscape mapping — Kerry Jones, Kabi Kabi First Nation and Susie Chapman, Healthy Land and Water

Mangrove rehabilitation — Kerry Jones, Bunya Bunya Country Aboriginal Corporation, and Professor Norm Duke, James Cook University/ MangroveWatch

9.35am

Session 3) Keynote Address — Graham Webb, Sunshine Coast Council - host

MIKE RONAN — Manager, Wetland Unit, Queensland Government Department of Environment and Science

The Pumicestone – a catchment like no other

MORNING TEA 10.20 - 10.50am

Session 4) Community Knowledge & Stewardship — Peter Armstrong, Sunshine Coast Council - host

Whip-Skew and other acronyms — Helen Kershaw and Jude Crighton, Wildlife Preservation Society of Queensland – Sunshine Coast

Influencing Bribie Island's future with Citizen Science — Diane Oxenford, Bribie Island Environment Protection Association

TS Onslow Naval Cadets Shoreline Management Project — Ken Mewburn, Take Action for Pumicestone Passage

Vigilance for a Clean Passage — Sharon Watkins, Night Eyes Water and Land Care

Fisheries of Pumicestone Passage 2021 — Dr Ben Diggles, OzFish Pumicestone

Pumicestone Shellfish Habitat Restoration Project — Susie Chapman, Healthy Land and Water

Short videos: — Tangalooma Ecomarines - Penny Limbach; Unity College - Tanya Woods; Glass House Christian College - Jade King

LUNCH 12.35 - 1.05pm

Session 5) Marine Habitat & Species — Dr Ben Gilby, University of the Sunshine Coast - host

Dynamic changes in Pumicestone Passage sediment quality and distribution — Dr Alistair Grinham, University of Queensland

Water Quality Report Cards and Trends — Naomi Soustal, Healthy Land and Water, and David Moffat, Department of Environment and Science

Recent trends in seagrass distribution in the northern Pumicestone Passage and opportunities for improved low-cost monitoring — Dr. Conor Jones, BMT

Jellyfish of the Sunshine Coast — Raeleen Draper, Sunshine Coast Council

Managing Lyngbya blooms in Moreton Bay: What has the research taught us? — Professor Michelle Burford, Griffith University

Migratory shorebird monitoring and observations — Jill Chamberlain, Wildlife Preservation Society of Queensland – Sunshine Coast branch

Managing threats to migratory shorebirds in Moreton Bay — Professor Richard Fuller, University of Queensland

Fish communities of Pumicestone Passage; Effects of human impacts, management and restoration — Dr Ben Gilby, University of the Sunshine Coast

Monitoring natural shellfish recruitment for Pumicestone Passage — Dr Ben Diggles, OzFish Pumicestone

Dugong and Water Mouse in and along the Pumicestone Passage — Janina Kaluza and Jessica Mowat, Moreton Bay Regional Council

AFTERNOON TEA 3.25 - 3.45pm

Session 6) Climate Impacts & Adaptations — Gabriel Conroy, University of Sunshine Coast – host

Our Resilient Coast, Our Future – A Coastal Hazard Adaptation Strategy for the Sunshine Coast — Gary Duffey, Sunshine Coast Council

Northern Bribie Island ocean breakthrough - coastline evolution in the spotlight — Sel Sultmann, Queensland Government Department of Environment and Science

Moreton Bay Regional Council Living Coast: Coastal Hazard Adaptation Strategy — Glen Dare, Moreton Bay Regional Council

Viewing the Pumicestone Catchment through the lens of ecosystem functions and services — Simone Maynard, University of Sunshine Coast

Monitoring erosion on pineapple farms using drones — Dr Javier Leon, University of Sunshine Coast

FINISH 5pm

PROGRAM

DAY TWO

Wednesday 17th February, 2021

8.30am start

Session 7) Terrestrial Habitat & Species — Ben McMullen, Moreton Bay Regional Council – host

- Protecting the biodiversity significance and nature conservation values of the Pumicestone Region — Shannon Mooney, Healthy Land and Water
- Northern Pumicestone Passage Core and Connecting Habitat Mapping of the Northern Pumicestone catchment — Richard Newton, Sunshine Coast Council
- Habitat Corridors – Moreton Bay Regional Council Green Infrastructure Network Program — Bernadette May, Moreton Bay Regional Council
- Nature conservation in the Pumicestone catchment – significant challenges with diverse solutions — Deborah Metters, Land for Wildlife
- Biosecurity priorities for the Pumicestone Catchment — Stacy Harris, Queensland Department of Agriculture and Fisheries
- Fauna presence within a conservation zone around North and South Bells Creek — Dr Paul Smith, Wildlife Preservation Society of Queensland - Sunshine Coast Branch

MORNING TEA 10.10 - 10.40am

Session 8) Agricultural Knowledge & Science — Rachel Abel Queensland Department of Agriculture and Fisheries - host

- Regional Economic Profile of Agriculture in the Pumicestone Catchment — William Johnston, Queensland Government Department of Agriculture and Fisheries
- Water Quality Monitoring for nitrate and pesticides in the Pumicestone Passage Catchments — Dr Reinier M. Mann, Queensland Government Department Environment and Science
- The SEQ Water Quality project for Horticulture growers — Lene Knudsen and Rowena Beveridge,Growcom
- Sandy Creek Pineapple Farm — Sam Pike
- Green Valley Finger Limes — Jade King
- Pinata Farms — Gavin Scurr
- GoTurf — Anthony Heilig

- Research into farming systems focusing on water quality outcomes and sustainable farming systems — Rachel Abel, Queensland Department of Agriculture and Fisheries
- **Panel discussion** — with Tim Wolens

LUNCH 12.40 - 1.20pm

Session 9) Sustainable Development — Professor Claudia Baldwin, University of the Sunshine Coast - host

- Moreton Bay Regional Council Outdoor Recreation Plan 2019-2031 — Hannah Myers, Moreton Bay Regional Council
- Inter-Urban Break Outdoor Recreation Plan — Stacey Bentley, Sunshine Coast Council
- Sustainable Urban Development Practices: Aura — Mark Stephens, Stockland
- Sustainable Water Management – Innovative options for delivering a water resilient coast — Jane-Louise Lampard, University of the Sunshine Coast
- Using Constructed Floating Wetlands to Treat Urban Runoff in a Saline Waterway — Kevin Covey, Pelican Waters Heart Pty Ltd and Jane-Louise Lampard, University of the Sunshine Coast
- Managing safety, productivity and stewardship in a peri-urban, commercial plantation forest — Michael Robinson and Michelle McAndrew, HQPlantations

AFTERNOON TEA 3.15 - 3.45pm

Plenary — Mike Ronan

Summary from each session host

Opportunity to have input in the following questions for each theme:

- What do we know well?
- What do we not know well?
- Priority issues
- What are our responses?

Session 10) Poster Presentations

Quick pitch

Each present one-slide on the stage before the presentations in front of the posters.

DRINKS 4.30 - 5.30pm

PROGRAM

DAY THREE

Thursday 18th February, 2021

8.30am start

Session 11) Knowledge Informing Action _____ Dr Paul Maxwell, Alluvium - Facilitator

Presentation of summaries and research gaps from Days 1 and 2

The Pumicestone Catchment Management Program - Working together to preserve the Pumicestone Passage and its catchment _____ Graham Webb, Sunshine Coast Council

The SEQ NRM Plan – reviewing progress, directing the future through stakeholder participation _____ Liz Gould, Healthy Land and Water

Roundtable discussions within and across sectors

MORNING TEA 10.30 - 11am

Continuing workshop

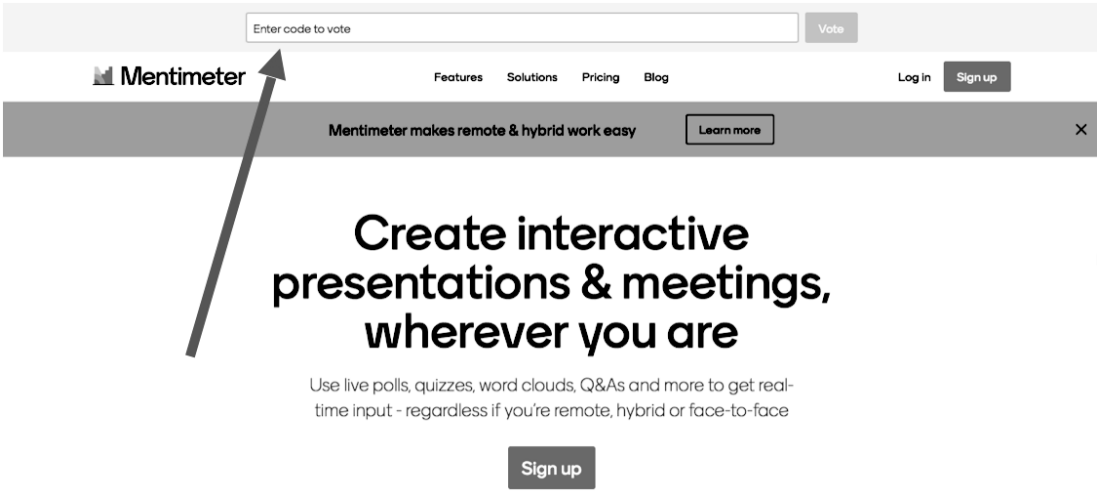
LUNCH 12.30 - 1.10pm

Continuing workshop

CONFERENCE FINISHES 3.00pm

Get involved with Mentimeter

Mentimeter is an online interactive service which allows the audience to submit their questions and presenters to conduct polls via your mobile phones. Mentimeter will be used for the duration of the Convergence, allowing equal opportunity for responses from those at the conference and those joining virtually. You can access Mentimeter by https://www.mentimeter.com or searching 'Mentimeter' in your browser. Once on the website, if you enter the given event code in the search bar at the top (see image below) and press enter, you will be taken to the session in progress.



Pumicestone Catchment Convergence 2021

Insights for a healthy future

This three-day conference brings together wisdom, knowledge and know-how gained over the last ten years, galvanising fresh interest and energy for a healthy future for the Pumicestone Passage and its catchment.

A decade after the last Pumicestone Science Conference in 2011, and two decades after PASSCON2000 and the Pumicestone Region Catchment Management Strategy 2000, this timely review will celebrate the 50th anniversary of the signing of the Ramsar Convention for the Protection of International Wetlands in 1971 by highlighting the outstanding ecological values of the Pumicestone Passage as part of the Moreton Bay Ramsar Wetland.

The learning from the first two days will inform the third day's discussions to develop the next iterations of the Pumicestone Catchment Action Plan 2021-2014 and the SEQ NRM Plan. Presentations will be available in pdf and video on the TAPP website following the event https://takeactionpumicestonepassage.com.au

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DAY 1: 16 February 2021

Session 1. Welcome and Introduction
Host - Susie Chapman, Healthy Land and Water

1.2 Welcome to Country
Uncle Gordon Cowburn - Traditional Owner Kabi Kabi

1.3 Acknowledgement of Country
Jason Murphy - Traditional Owner Jinibara

1.4 Welcome to the University of the Sunshine Coast
Professor Helen Bartlett Vice-Chancellor and President
University of the Sunshine Coast (USC)

Professor Helen Bartlett commenced as the third Vice-Chancellor and President of USC in August 2020. Prior to this, Professor Bartlett was Vice-Chancellor and President of Federation University Australia, Pro Vice-Chancellor and Chief Executive of Monash University Malaysia, and Pro Vice-Chancellor and President of Monash University's Gippsland Campus.

A research specialist in health and aged care, Professor Bartlett's career includes inaugural Director at the Australasian Centre on Ageing at the University of Queensland, the Oxford Centre for Health Care Research and Development and the Oxford Dementia Centre at Oxford Brookes University. She is the current Chair of the Regional Universities Network, an expert member of the Australian Government Council for International Education, and a member of the Australian Government's National Priorities and Industry Linkage Fund Working Group.

Session 2. Traditional Knowledge Projects in the Pumicestone

2.1 Shell Midden Mapping in Pumicestone
Kerry Jones, Traditional Owner Kabi Kabi
Michael Strong, Turnstone Archaeology

Kerry Jones is a Kabi Kabi man, born and bred on the Sunshine Coast. He has been an applicant for Kabi Kabi First Nation since it was registered as a Native Title claimant in 2016, and is Director of his family organisation, Bunya Bunya Country Aboriginal Corporation.

Michael Strong is the director and principal archaeologist of Turnstone Archaeology with an M.A. (Archaeology & Heritage) from the University of Leicester, UK. Michael is a full member of the Australian Association of Consulting Archaeologists, a Member of the Australian Archaeological Association, and a member of the British Society of Master Glass Painters. He was awarded the Centenary Medal in 2020 by the Royal Historical Society of Queensland for exemplary and unique leadership in the preservation of history and cultural heritage. He has successfully managed hundreds of heritage projects, large and small, since 1994 and has established a leading reputation in Queensland as a landscape archaeologist and cultural heritage manager. His current research interest is developing an environmental predictive model that has major advantages in understanding traditional clan boundaries, site location and reconstructing lost cultural landscapes for Aboriginal communities, government agencies and environmental planners. Michael works closely with numerous Aboriginal communities throughout Queensland.

Abstract:
Once plentiful along the coast, culturally significant Aboriginal shell middens are disappearing at an alarming rate from erosion, trampling, visitation and infrastructure development. Middens are time capsules providing information about climate change, coastal morphology and transformation, Aboriginal environments and land use, food sources and other marine resources.

To date, there has been no recent comprehensive midden mapping undertaken for the Kabi People. This important project conducted by Kabi Kabi First Nation Applicant, Kerry Jones, and auspiced by Bunya Bunya Country Aboriginal Corporation, followed an Indigenous community-based strategy of location, identification and documenting middens on Bribie Island and along Pumicestone Passage. The project was highly successful with 22 previously undocumented middens identified. Several stone arrangements, included a fish trap, were also identified and perhaps the first evidence of Aboriginal oyster breeding.

The most obvious result from the Kabi Shell Midden Project is the urgent need for further identification and protection of the shell middens at risk in the Pumicestone Passage. Climate change leading to higher sea levels and human interference pose the greatest threats. It is tragic that many middens have already lost the greater percentage of their area to the sea. More than half of the 63 recorded middens have been damaged by erosion from king tides and higher sea levels and probably more frequent storm surges. We face the loss of the majority of our coastal middens unless urgent action is taken.

2.2 Cultural Burning and landscape mapping
Kerry Jones
Susie Chapman

In a first for the Sunshine Coast, Kabi people were supported to reintroduce cultural fire management with a controlled burn in June 2016 following the traditional approach at Stockland's Aura development on Bells Creek. With training from cultural fire mentors Victor Steffensen and Oliver Costello, members of Kabi Kabi First Nation and Bunya Bunya Country Aboriginal Corporation undertook a cultural burn backed by five Rural Fire Brigades, Queensland Fire and Emergency Services, SEQ Fire and Biodiversity Consortium, SEQ Catchments and landholder Stockland. After use for grazing and pine plantation, the coastal ecosystem of the Aura Environmental Protection Zone was regenerating with an overabundance of melaleuca and casuarina. A restoration report written by Dr Rob Lamont identified the need to introduce frequent fire to the ecosystem to promote biodiversity and reduce risk of wildfire, and to involve Traditional Owners in a cool mosaic burning process. https://vimeo.com/183412469. Since 2016, despite good planning to follow up with burns in this coastal ecosystem, the weather has proved unsuitable with late Autumn rains and early Winter winds.

On Bribie Island, Kabi Kabi members have been supported by Healthy Land and Water, David Kington, Qld Fire and Biodiversity Consortium and QPWS to map and measure the ancient trees still alive amongst the whipstick regrowth, working together with Turnstone Archaeology to understand the cultural fire history as it relates to significant cultural heritage sites. The aim is to reintroduce frequent cultural burning practices to protect the living artefacts from wildfire and promote biodiversity, prioritising the key areas such as the cypress camps.

2.3 Mangrove Rehabilitation
Kerry Jones - Bunya Bunya Country Aboriginal Corporation
Professor Norm Duke – James Cook University

Bunya Bunya Country Aboriginal Corporation (BBCAC) are descendents from Kabi Kabi and South Sea Islanders who have lived and fished on the waters of the Maroochy and Mooloolah Rivers for many centuries.

Dr Norm Duke (MSc, PhD), mangrove ecologist specialises in global mangrove floristics, biogeography, climate change impacts, vegetation mapping, pollution damage, restoration ecology and habitat condition assessment. Over the last 49 years, his workplaces included Queensland Fisheries, the Australian Institute of Marine Science, Smithsonian Tropical Research Institute in Panama, and the University of Queensland. Norm currently leads an active research group on marine tidal wetlands at James Cook University (JCU). He has authored more than 300 research articles and technical reports, including his authoritative popular book 'Australia's mangroves', along with two mangrove identification apps. One of Norm's on-going achievements is the discovery and naming of 9 of the world's 80 mangrove plant species. Over the last 3 years, Norm has led Australian National Environmental Science Program investigations into the 2015 catastrophic mass dieback of mangroves in Australia's Gulf of Carpentaria. All his recent projects and community engagements have involved close collaboration with, and the training of, Traditional Owner rangers as well as many community volunteers.

Abstract:
Ten years ago, BBCAC started trialling propagation and planting of mangrove seedlings with support from Sunshine Coast Council and SEQ Catchments to establish a mangrove nursery in the tidal waters of their land at Bli Bli. The riverbank was being eroded by boatwash, and the mangroves were a way to stabilise the banks and build more fish habitat. Since then, BBCAC members have developed extensive knowledge and skills on mangrove species, seasonality, planting media and practices, and have undertaken many projects along the Maroochy River and Pumicestone Passage. Professor Norm Duke from MangroveWatch and James Cook University, a world expert in mangrove plant identification and forest ecology, provided added guidance on mangrove nursery techniques and how to choose mangrove species for maximal management outcomes.

For the TS Onslow Shoreline Management Project at Golden Beach, BBCAC collected low-growing red or stilted mangrove (*Rhizophora stylosa*) seeds from Bells Creek under permit, propagated them at their nursery and planted at least 900 seedlings at the site over the past 5 years. With considerable damage caused by vandalism, continual enrichment planting is underway and some mangroves are now well established. Professor Norm Duke designed and directed the installation of a novel fish-scale shaped soil stabilisation system using coir logs for the establishment of highly beneficial living shoreline mangrove gardens as the essential contributors to threatened tidal wetlands - the often unsung natural guardians of our fragile coast.

Session 3. Keynote address
Host - Graham Webb, Sunshine Coast Council

The Pumicestone - a catchment like no other
Mike Ronan
Manager Wetlands Unit
Queensland Government Department Environment and Science (DES)

Mike is Manager for Wetlands, in the Policy and Programs Division of the Queensland Department of Environment and Science. He is responsible for many initiatives that have been used to achieve policy objectives in Queensland including: requirements under Reef 2050 Plan; the Murray Darling Basin Plan; the Lake Eyre Basin Agreement; the Strategy for the Conservation and Management of Queensland's Wetlands; Queensland requirements under Ramsar and international migratory birds agreements; and the development and management of the WetlandInfo website.

Mike represents the interests of Queensland wetlands on many national and state groups, including the National Wetlands and Aquatic Ecosystem Sub-Committee. He has worked for the Queensland Government for over 20 years in Wetlands, Operations, Marine Parks, Coastal Management and Waste Management. Mike has also worked for the Port of Brisbane and CSIRO as an environmental consultant and has extensive overseas experience in Europe and America. He holds a BSc (hons) in Zoology and an MSc in Marine Biology.

Abstract:A combination of geological, hydrological, biological and human features makes each catchment unique. For such a small catchment, the Pumicestone has a significant range of values, including being part of the internationally important Moreton Bay Ramsar site. We will look at how this catchment sits within the broader context of Australia and Queensland. We will follow how water moves through this landscape and follow its flow from the headwaters in the D'Aguilar range and the Glasshouse mountains, through the floodplains to the Pumicestone passage.

The catchment has been vitally important to first nations people for many generations. Ecological values include extensive mangrove and 'wallum" ecosystems and many threatened terrestrial and aquatic species. There is a significant agricultural

sector and an increasing population, drawn to the many unique features of the area. The area has a well-developed tourist sector with people drawn to the many scenic landscapes such as the iconic glasshouse mountains. We will examine how the unusual combination of landscapes within the catchment provides the opportunities for so many values to co-exist.

Using a partnership approach and a facilitated workshop process we virtually "walked-the-landscape" with local knowledge experts. Using published information and data from the workshop a "catchment story" video was developed which tells the story of the catchment. The process has allowed everyone to be "on-the-same-page" about how the catchment works, a fundamental building block for any catchment management activities.

Session 4. Community Knowledge & Stewardship
Host - Peter Armstrong, Sunshine Coast Council

4.1 Whip-Skew and other acronyms
Helen Kershaw, Jude Crighton
Wildlife Preservation Society of Queensland Sunshine Coast Branch

Jude Crighton grew up in in Maryborough, spending weekends and holidays by the (then very) quiet waters of Hervey Bay. Inspired by early visits to Fairhill Nursery and by the writings of Kathleen McArthur, Jude developed an interest in the local flora and fauna. After returning permanently to the Sunshine Coast in 2009 Jude joined the Friends of Ben Bennett Bushland Park and thence the local branch of WPSQ, as well as local BushCare and DuneCare groups. The Sunshine Coast Wildflower Festival, started by Kathleen McArthur and the Caloundra Branch of WPSQ in 1967 and carried on by local environmental groups with the support of Sunshine Coast Council is now an annual highlight and ongoing education for Jude, as are outings with WPSQ's Faunawatch project. The mentorship of Jill Chamberlain of WPSQ has been a profound influence.

With a love of the wild places of Caloundra since early days of holidaying in the 1950s and 60s and then living and working as a librarian in Council public libraries since 1978, Helen Kershaw has participated in the activities of the Australian Littoral Society, the Sunshine Coast Environment Council and WPSQ's Caloundra (now Sunshine Coast & Hinterland) Branch. Knowing some of those pioneering leaders in the Coast's environment movement, and in particular Kathleen McArthur and her inspirational work as a botanical artist, has led to greater involvement in WPSQ for Helen. Helen is an Accredited Editor with the Institute of Professional Editors (IPEd) and has collaborated with local and other authors on history and memoir projects, and currently edits the group's newsletter Conservation News. Participation in local BushCare groups keeps Helen fit and connected with like-minded folk and those almost-wild places that survive in Caloundra.

Abstract:
The legacy of early community environmental groups is coloured by their founders and followers who set the pace and steeled the nerves in battle against those with an eye for making capital out of our natural environment. WPSQ Sunshine Coast and Hinterland Inc is one such group whose focus is sharpened through the work and attitude of founder Kathleen McArthur (1915-2000). All groups past and present (and there are many acronyms out there) no matter their size or particular their focus are part of the essential checks and balances required in environmental advocacy.

4.2 TS Onslow Naval Cadets Shoreline Management Project
Ken Mewburn, Take Action for Pumicestone Passage (TAPP)

Ken Mewburn OAM was born and raised on a farm in Dubbo, central NSW. Ken pursued a career in general aviation as charter pilot and instructor, then joined an Oil Company at Mascot Airport Sydney, working through the ranks to position of Manager Airport Operations, then Aviation Services and Quality Control Manager for NSW and QLD. He was particularly interested in the environmental impacts of fuelling installations and worked to improve the standards. He was a founding member of TAPP in 2010.

Abstract:
TS Onslow Naval Cadets lease is situated on land reclaimed in the 1970s and is subject to coastal erosion, which continued to increase with increasing development in the catchment. Various controls were implemented to protect the shoreline including concrete blocks, however the impacts of erosion continued and in 2009 more blocks were placed, without approval. The TS Onslow voluntary committee was asked to remove these and install an engineered rock wall. The cost was prohibitive so alternatives were sought. 'Soft' engineering involving mangrove rehabilitation was suggested by TAPP member Michael McNamara, and SEQ Catchments convened a group of community and agencies to work toward achieving this cheaper and more ecologically beneficial option. Stage 1 was completed in 2016. Stage 2 area was severely impacted by Cyclone Oma in February 2019 and restoration commenced in March 2019. Stage 2 was completed in October 2019 and has stabilised the adjacent beach area. Mangroves are slow growing and the ultimate benefits of improved fish habitat and natural values will be realised over time with ongoing natural improvement in erosion control.

4.3 Influencing Bribie Island's future through Citizen Science
Diane Oxenford, Bribie Island Environment Protection Association (BIEPA)

In 2006 Diane and John Oxenford retired to Australia after 30 years raising three children in the frozen boreal forests of northern Canada and then the prairies, far from the warmth and smell of Queensland's beaches. Serendipity brought them to Bribie Island, a unique place where the sights, sounds and smells of Nature were all around. The book that triggered Diane's quest for understanding the coastal ecology was "The Living Beach" by Canadian environmentalist, Silver Donald Cameron. Over the years, Diane has metamorphosed into many colloquial identities eg "Wolf Lady", "Pain in the Butt" (to Politicians and Company Executives), "Turtle Lady", and long-term President of BIEPA.

Abstract:
Bribie Island is a fauna and flora sanctuary situated within the Pumicestone Passage and Moreton Bay, protected under the UN Ramsar Convention on Wetlands of International Importance. Coastal development and unsustainable tourism models are incrementally destroying Bribie Island's natural assets, causing a loss of habitat for endangered and threatened resident and migratory species protected under the UN Convention. The sand dunes along the full length of Bribie Island are under threat from sea level rise and increased intensity and frequency of weather events. One of the major threats to the stabilisation of the sand dunes is uncontrolled pedestrian and vehicle access which is destroying the fragile beach ecology and the ecosystems which are interdependent. BIEPA is a group of concerned citizens which almost 40 years ago as a result of the decrease in fauna sightings. The Bribie Islanders came together to promote the concept of Bribie Island becoming a fauna sanctuary and the protection of native flora. While recognising the pressures for development on the island, BIEPA's objective is to ensure development occurs in harmony with the natural environment, and does this through a number of Citizen Science projects, educational and creative endeavours, and lobbying decision-makers.

4.4 Fisheries of Pumicestone Passage 2021 – the need to recognise shifted management baselines in the face of accelerating marine environmental decline.
Dr Ben Diggles (Digsfish Services), Elle Veary (OzFish Pumicestone), Fred Palin (Joondoburri)

Dr Ben Diggles is a marine biologist and Director of DigsFish Services, an internationally recognised fish health consulting company based on Bribie Island, which was established in 2003 to provide aquatic animal health services to industries and governments throughout Australasia. Dr Diggles has published hundreds of papers and reports over the past 30 years on issues as diverse as parasites and diseases of wild and aquacultured fish and shellfish, national and international biosecurity frameworks, pathogen risk analyses, fish welfare, fish kill investigations and environmental standards for fishing tournaments.

Abstract:
Holocene sea level rise (12000-7000 ybp) formed the pristine and highly productive Pumicestone Passage estuary, which provided sustenance and cultural services for indigenous peoples for thousands of years. Following European settlement in 1823, Pumicestone Passage remained a highly productive fishery with abundant finfish and shellfish resources. However, by the 1890's eutrophication and sedimentation from catchment clearing began to damage the oyster fishery, first signalled by loss of biogenic subtidal shellfish reefs in formerly highly productive "dredge sections". By the late 1960's the oyster industry was in rapid decline due to emergence of QX, a disease process triggered by sedimentation and immune suppression due to chemical runoff from agriculture and forestry in adjacent river catchments. Throughout the 21st century decline of the ecological health of the passage has continued, signalled by accelerating frequencies of algal blooms and fish kill events.

Recent oyster gardening and shell recycling initiatives for the Pumicestone Shellfish Habitat Restoration trial at Kakadu Beach have raised community awareness of the loss of these ecosystems and the many critical ecological services they once provided, uncovering a groundswell of community support to reverse the decline. However, the Moreton Bay Marine Park was established in 1993 on a shifted management baseline which does not currently accommodate restoration of these critical ecosystems. In the face of continuing catchment development, only by a concerted effort to improve the quality of runoff and permit/promote active restoration of underwater habitats will governments and community be able to slow or reverse the decline of this highly stressed marine ecosystem.

4.5 Pumicestone Shellfish Habitat Restoration Project
Susie Chapman, Healthy Land and Water

Susie Chapman OAM is a Senior Scientist and Regional Agriculture Landcare Facilitator for Healthy Land and Water in South East Queensland based at the University of the Sunshine Coast. She has worked in integrated catchment management, collaborative climate adaptation, citizen science, coastal management and indigenous land management. In 2012 she won the Australian Government Local Landcare Facilitator/Co-ordinator award for Australia. In 2012 she was awarded an Honorary Senior Fellowship at USC and in 2019 an Order of Australia Medal for services to Environment and Conservation.

Abstract:
In 2015, Healthy Land and Water launched the Pumicestone Shellfish Habitat Restoration Project alongside Traditional Owners, community and recreational fishing groups, a local oyster farmer, Moreton Bay Regional Council, Unitywater, and the University of the Sunshine Coast (USC) to work toward restoring the Pumicestone Passage's lost shellfish habitats to enhance fish stocks, marine biodiversity, and ultimately improve water quality in the Pumicestone Passage. The project also supported the mapping and protection of cultural heritage values associated with shellfish. The project began with the installation of 16 reef units of various types at 3 to 5 metres depth within one hectare off Kakadu Beach, Bribie Island. These were augmented in 2018 with two additional patches (~38m2) of recycled oyster shell including one with live shell, and again in 2019 with two larger patches (~78m2) of dead shell only.

Fish assemblages at the restoration site were 3.8 times more speciose and had 16.4 and 10.7 times more harvestable fish and total fish abundance, respectively, than before restoration. The abundance of fish at the reef site meant that few differences in fish assemblages were identifiable between the six reef unit types. We found no significant change in the distribution of fish assemblages relative to the restoration site over time, thereby indicating no attraction effect of the reef, but instead an overall increase in fisheries productivity. OzFish invertebrate surveys found significant recruitment and survival of rock oyster spat and other invertebrates on reefs > 50cm, as well as evidence of anchor damage.

4.6 Vigilance for a Clean Passage - Night Eyes Water and Land Care
Sharon Watkins

Sharon Watkins has recently retired from corporate life in Sydney and made the sea change to the Sunshine Coast. Upon arriving Sharon set out to join her local landcare volunteer organisation – Night Eyes Water and Landcare. It only took a couple of months for Sharon to decide she wanted a deeper involvement with this environmental group by volunteering to become their new Company Secretary. Sharon is an active member of the group, heading out each week to help with the activities of maintaining a clean environment for our locals and wildlife in the Pumicestone Passage catchment areas.

Abstract:
Night Eyes was formed 20 years ago by Golden Beach resident Greg McKean to keep a watchful eye over happenings in the Pumicestone Passage and surrounding areas. Most of the operation was done at night - hence the name. The operation has changed considerably now with no night work, and has grown from one or two people to a membership approaching 100 – that a lot of 'eyes' watching over our local water and land. They now have a larger and more suitable boat allowing a larger payload and easier transport of personnel. Night Eyes is wholly operated by volunteers. Last year they collected over 100,000 litres of rubbish from the Pumicestone and its catchment, trying to clean up the litter before it reaches the water.

4.7 Our mission: To inspire a community of environmental heroes
Tangalooma EcoMarines

Short video: https://www.youtube.com/watch?v=E5r35VQ33NI&feature=emb_logo
We inspire and empower students to become conservation leaders through our award-winning school programs. Our programs and events enable students and teachers to network with other schools, connect with local businesses, and learn from traditional owners and industry experts.

Our student ambassadors encourage the school network to identify and tackle challenges impacting their local community in a fun and creative way. These passionate students are creating a wave of environmental change. They are the guardians and future leaders of our planet.

4.8 Unity College – video

4.9 Glass House Mountains Christian College - video

Session 5. Marine Habitat and Species
Host: Dr Ben Gilby, University of the Sunshine Coast

5.1 Dynamic changes in Pumicestone Passage sediment quality and distribution
Dr Alistair Grinham, University of Queensland

Dr Alistair Grinham has over 20 years' experience in monitoring sediment dynamics of rivers, freshwater reservoirs and coastal systems. Alistair joined the School of Civil Engineering in June 2007 to develop environmental monitoring systems to better understand sediment transport and biogeochemical processing in freshwater and marine systems. Alistair employs a multi-disciplinary approach using traditional campaign-style monitoring programs along with advanced autonomous monitoring systems to ensure data collection occurs at appropriate spatial and temporal scales. These award-winning monitoring systems have been successfully applied to water quality and sediment investigations across a diverse range of water bodies, including over 15 years of ongoing programs in Moreton Bay and its catchment.

Abstract:
Pumicestone Passage is a tidal waterway of high cultural, ecological and recreational value, located in Northern Moreton Bay, South-East Queensland. In the last 150 years, the Passage has come under increasing pressure from catchment modification and increasing community concern over waterway health. A comparative study was conducted in order to establish current sediment quality and distribution in the Passage with past surveys undertaken in 1980 and 2015. This comparison has shown that overall, the Passage experienced a significant increase in mud distribution, attributed mainly to extensive land clearing and construction of urban development. However, the trend is complicated and comparison with the 2015 survey show some areas are experiencing decreases in mud. A potential driver identified for this may be changes in catchment management. A significant reduction in metals, and no detectable pesticides were further identified, highlighting the effects of land use changes on these. Overall, the study findings indicate that Pumicestone Passage is a highly variable environment, where a complex range of systems affect sediment quality and distribution. The study provides a baseline data set, relevant for future comparison in the face of continuing urbanisation.

5.2 Water Quality Report Cards and Trends
Naomi Soustal, Healthy Land and Water
David Moffat, Queensland Government Department of Environment and Science

David Moffatt is a Principle Environmental Officer at the Department of Environment and Science with twenty-five years' experience in the design, establishment and delivery of major field-based research and monitoring projects. David specialises in; water quality, aquatic ecology, fish and fisheries biology and ecology; ecological assessment of freshwater, estuarine and marine ecosystems; and field research logistics and statistical analysis of ecological data. David holds a degree and post-graduate qualifications in Aquatic Ecology from the University of Queensland.
Naomi Soustal is an Environmental Scientist working with stakeholders to support water quality monitoring, research, and management effort across South East Queensland. Naomi coordinates the preparation of the Healthy Land and Water Report Card to communicate the social, economic and environmental drivers and pressures on water quality to encourage investment in catchment management and stewardship activities.

Naomi has over 18 years' experience in science communication, water quality monitoring, catchment management, citizen science and education for sustainability underpinned by qualifications in Ecology and Environmental Science and Natural Resource Management.

Abstract:
The Healthy Land and Water Report Card is a tool used to communicate the condition of South East Queensland's waterways to stakeholders. It provides a high level summary assessment of freshwater, estuarine and marine waterways based on social, economic and environmental indicators. An Environmental Condition Grade (A-F) and Benefit (social and economic) of Waterways Rating (1-5 stars) is assigned to each catchment based on data collected throughout the year. Pumicestone Passage has performed well these past 5 years with grades ranging between B- to A- and ratings of 4.0 to 4.5 since 2015. However, in 2010 the water quality in the estuary dropped to its lowest grade of D+1 instigating the preparation of the Pumicestone Passage Catchment and Action Plan (2013-2016)2. Implementation of the plan appears to have maintained water quality, with some improvements, despite increased population and development pressues. However, detailed analysis of the data indicates that there are still water quality issues occurring within the catchment and estuary. Pollutant loads (nutrients and sediment) generated from the catchment, particularly during rainfall events, as well as habitat (seagrass, wetlands and riparian) pressure and elevated ammonia and dissolved forms of nitrogen (NOx) have been recorded. These results, as well as the need for ongoing adequate catchment monitoring and management to ensure Pumicestone Passage continues to support the communities high recreational use, cultural and economic value and sensitive ecosystem health; will be explored during this presentation.

5.3 Recent trends in seagrass distribution in the northern Pumicestone Passage and opportunities for improved low-cost monitoring
Dr Conor Jones, BMT

Dr Conor Jones is a Principal Scientist at BMT, where he has worked for the last 10 years on a range of environmental consulting projects. His prior research at the University of Queensland examined interactions between parasites and fishes on the Great Barrier Reef, and the recruitment of coral reef fishes. He enjoys a range of technical tasks including electrofishing, commercial diving, acoustic mapping, remote sensing, underwater photogrammetry and drones. He also loves data analysis, GIS and working with the numerical modellers at BMT. His role at BMT includes managing projects for Local Governments, mining and ports, the State Governments and Non-Government Organisations. He is the monitoring program director for remediation processes at Douglas Shoal for the Federal Government, which is challenging but extremely rewarding.

Abstract:
WB has conducted annual seagrass surveys in the vicinity of sand sourcing works for the Sunshine Coast Council in the northern Pumicestone Passage since 2017. Community composition, percent cover, and extent have been mapped based on ground-truthing of recent high-resolution aerial imagery.

Community changes have largely been driven by the presence and absence of colonising species amongst relatively unchanging Zostera muelleri meadows. After a low point in extent following cyclone Debbie in 2017, total extent increased through to 2019 and has remained steady through to 2020. These increases in total extent are consistent with increasing extent elsewhere in Moreton Bay.

To this point, meadow extent, cover, and community composition have been manually digitised using ground-truthing data and high-resolution RGB imagery. While greater spectral information is freely available from Sentinel2, pixel resolution is too coarse for the required mapping resolution of this project. The presence of wrack and benthic microalgal mats have been difficult to discern from seagrass; requiring extensive ground-truthing effort. Computer vision machine learning offers great potential to improve the speed and objectivity of digitisation. Initial results of model-training using data from the northern Pumicestone Passage are presented.

5.4 Jellyfish of the Sunshine Coast
Raeleen Draper, Sunshine Coast Council

Raeleen Draper is the Environmental Operations Senior Project Officer for the Coastal, Constructed Water Bodies and Planning team at Sunshine Coast Council. She is currently responsible for a number of coastal environmental projects including this seagrass monitoring, marine creature monitoring in constructed waterbodies, investigating the spread of invasive fish within our water bodies and the recently launched Coastal Discovery Van. Raeleen has an honours degree in Marine Biology and Zoology and has spent many years in coastal and terrestrial environments working with sharks, jellyfish, turtles, crocodiles and flying foxes around Australia.

Abstract:
For the past four years Sunshine Coast Council officers have been working with experts from CSIRO and Queensland Museum to identify, quantify and record the jellyfish species that reside in our waterways over the summer months – from November to March. The surveys were undertaken to establish a picture of the “normal” microscopic jellyfish that live here. Once there is a better understanding of what our plankton communities look like, we will be better able to investigate any changes that may be happening to that community associated with the variations of climate change.

Plankton, and in particular jellyfish, are the building blocks of our oceans. All manner of animals feed on plankton, from small juvenile fish like we find in our estuaries here, to some of the largest animals in the ocean – humpback whales. Plankton is also a good indicator of waterway health and the make-up of the community can tell us a lot about the water quality and ecosystem resilience.

This project commenced in the summer of 2017 and is still continuing today with plankton samples being collected from seven sites across the Sunshine Coast – including two within the Pumicestone Passage. The species diversity, including the discovery of several new species, has been astounding– our waterways are teeming with gelatinous life.

5.5 Managing Lyngbya blooms in Moreton Bay: what has the research taught us?
Professor Michelle Burford, Griffith University

Professor Michele Burford is a researcher in the Australian Rivers Institute, Griffith University. She, and her team, undertake research on algal ecology and physiology in marine and freshwater systems, and the factors that drive algal productivity and blooms. She has more than 30 years experience in this area having published more than 160 scientific papers and book chapters, and trained 11 PhD students. Michelle sits on an international committee, GlobalHAB, which coordinates collaborative efforts to share information and research on harmful algal blooms. She works closely with various tiers of government and industries such as the water industry, aquaculture and fisheries to improve environmental management.

Abstract:
The benthic marine cyanobacterium, *Lyngbya majuscula* regularly blooms in Moreton Bay, especially in the summer months. Research on this species has been underway for more than 20 years, although in recent years research has been limited, despite the ongoing blooms. Typically, the scale of blooms is related to nutrient availability although the frequency and duration is more likely to be related to physical conditions, such as temperature and wind strength. Deception Bay remains a hotspot for regular blooms, but periodic blooms occur throughout the Bay where the substrate is suitable and the water is shallow enough. Managing blooms long term relies on catchment management strategies to reduce nutrient inputs to Moreton Bay, but there is also scope to improve monitoring and management using new technologies and approaches. This includes the use of drones for monitoring the spatial extent of blooms throughout the bay, and cyanobacterial control mechanisms, such as hydrogen peroxide, which as been successfully used in a number of countries.

5.6 Migratory shorebird monitoring and observations
Jill Chamberlain OAM, Wildlife Preservation Society Queensland Sunshine Coast Branch

Jill was born in England, married an Australian, and came to Australia in 1958. Having always been interested in the natural environment throughout her childhood, she soon took an interest in Australian wildlife. This led to membership of Wildlife Queensland and the Queensland Wader Study Group among others. In 2004 she was honoured by having a nature reserve named after her by the then Caloundra City Council. In 2010 she was awarded an Order of Australia (OAM) for her services to the environment and community and in 2011 the University of the Sunshine Coast made her an Honorary Senior Fellow.

Abstract:
This talk gives an outline of 28 years of observing and recording the many different species of waterbirds, both migratory and resident, which utilise the sandbanks of the Pumicestone Passage, part of the Moreton Bay Ramsar listed Wetlands.
Over this time the speaker has seen a disturbing drop in the numbers of migratory shorebirds coming from the northern hemisphere to rest and recuperate in the Pumicestone Passage. This is due to many factors occurring on their long flight to Australia from Siberia and Japan, along the East Asian - Australasian Flyway, the main one being the increasing loss of ‘staging posts’ in Korea, and Japan, through reclamation of important wetlands for industrialisation, and the fact that some birds are shot for food.

5.7 Managing threats to Migratory shorebirds in Moreton Bay
Professor Richard Fuller, University of Queensland

Richard Fuller is a Professor at the University of Queensland. He studies how people have affected the natural world around them, and how some of their destructive effects can best be reversed. To answer these questions, the lab group works on pure and applied topics in biodiversity and conservation, spanning the fields of migration ecology, conservation planning and urban ecology. Much of the work is interdisciplinary, focusing on the interactions between people and nature, how these can be enhanced, and how these relationships can be shaped to converge on coherent solutions to the biodiversity crisis. See www.fullerlab.org and www.facebook.com/fullerlab

Abstract:
Moreton Bay is one of Australia’s premier sites for migratory shorebirds, and it is recognised through its Ramsar listing. The site has about 35,000 birds visiting during the non-breeding season, and many hundreds of young birds use it as a

year-round nursery before they are mature enough to migrate. Many migratory shorebird populations are declining in Moreton Bay. Habitat loss along the migration routes of the birds in the Yellow Sea is a major cause of the declines, but recent analysis of local data suggests that threats operating in Moreton Bay also play an important role.

In this talk I will consider the threats impacting migratory shorebirds in Pumicestone Passage and more broadly throughout Moreton Bay, ranging from vulnerabilities in the network of available roosting sites, human disturbance at roosting and feeding sites, vegetation overgrowth, and deteriorating biomass of invertebrate prey in the sediment. I conclude that effective conservation of migratory shorebirds in Moreton Bay depends on a combination of local actions to address the threats operating within the Bay coupled with international actions aimed at securing the birds' safety all along their migration routes.

5.8 Fish communities of Pumicestone Passage: Effects of human impacts, management and restoration
Ben Gilby(USC), Andrew Olds, Rod M. Connolly, Paul S. Maxwell, Susie Chapman, Lucy A. Goodridge Gaines, Christopher J. Henderson, Nicholas L. Ortodossi, Karin Didderen, Wouter Lengkeek, Tjsse van der Heide, Thomas Schlacher

Dr Ben Gilby is a marine ecologist with expertise in the fields of ecological restoration, conservation biology, fish biology and ecology, and fisheries. His research focuses on optimising the ways in which we manage, conserve, and restore ecosystems for greatest ecological, social and economic outcomes.

Abstract:
The marine ecosystems of Pumicestone Passage are significantly threatened by human activities. The effects of habitat loss, catchment runoff and fishing combine to reduce the abundance and diversity of fish assemblages, and to change their distribution. Management can overcome these effects, but the degree to which specific management interventions affect fish assemblages relative to existing impacts remains unclear. Since 2015, USC, Griffith University, Sunshine Coast Council and Healthy Land and Water have collaborated on a diversity of projects seeking to quantify these effects in Pumicestone Passage. This research has progressed, now, to the point that drivers of fish communities are perhaps better understood in Pumicestone Passage than in any other estuary in Queensland. This presentation will cover the extent of studies and surveys conducted in Pumicestone Passage the past decade and will compare the results of these studies with results from other estuaries. We focus on two key case studies. The first, completed in 2015, showed that no fishing areas (i.e. 'green zones') in Pumicestone Passage are likely positioned in suboptimal locations if their intent is to enhance the abundance and diversity of fish assemblages. The second, completed in 2020, showed that the Pumicestone Passage Shellfish Reef Restoration Trial increased the overall carrying capacity of fish in the region despite variable runoff. Together, these case studies demonstrate the importance of considering the position and size of coastal habitats for fish and show how these considerations are vital for optimising conservation, restoration and management outcomes in Pumicestone Passage and beyond.

5.9 Monitoring natural shellfish recruitment for Pumicestone Shellfish Habitat Trial
Dr Ben Diggles (Ozfish), Porter R, Vardon K, Hawthorne S, MacFarlane C, Porter R, Porter J, Veary E, Veary A, Copeland C

Dr Ben Diggles is a marine biologist who specialises in study of the health of aquatic animals and their environment. He is a director of DigsFish Services, an internationally recognised fish health consulting company based on Bribie Island, which was established in 2003 to provide aquatic animal health services to Industries and Governments throughout Australasia. Dr Diggles has published hundreds of papers and reports over the past 30 years on issues as diverse as parasites and diseases of wild and aquacultured fish and shellfish, national and international biosecurity frameworks, pathogen risk analyses, fish welfare, fish kill investigations and environmental standards for fishing tournaments. For more information, see www.digsfish.com

Abstract:
The Pumicestone Shellfish Habitat Restoration Trial was undertaken to investigate methods for restoring lost subtidal shellfish reefs in Pumicestone Passage, northern Moreton Bay. Samples of recycled oyster shells deployed subtidally (3-5 meters depth) on experimental shellfish reefs were collected by divers every 3 months and examined for evidence of natural spatfall from rock oysters (*Saccostrea, Ostrea, Crassostrea, Dendostrea* spp.), other bivalves and invertebrate epibionts. After 12 months deployment, 7-meter diameter patch reefs constructed from recycled oyster shells that maintained a reef height > 50 cm above the surrounding substrate attracted natural spatfall ranging from 59 (covered) to 125 (uncovered) spat per 100 shells deployed, with 76% survival. Samples obtained from cage modules and a 2-meter diameter patch reef 24 months after their deployment found spatfall for the cage module had increased to 154 spat per 100 shells (82% survival), showing recruitment continued to occur at least 24 months post-deployment. In contrast, only 31 spat per 100 shells with low survival (19.4%) was evident on the 2-meter diameter patch reef after 24 months, probably due to reduced reef height (<20 cm) due to ongoing anchor damage. Biodiversity was high, with shells sampled from all reef types displaying colonisation by invertebrate epibionts which cemented shells into monolithic reef formations. Evidence of subtidal oyster spat recruitment and survival over successive years in uncovered shells piled > 50 cm above the bottom suggests that oyster reef restoration is feasible in Pumicestone Passage, and potentially also wider Moreton Bay.

5.10 Dugong and Water Mouse in and along the Pumicestone Passage
Jessica Mowat and Janina Kaluza, Moreton Bay Regional Council

Jessica Mowat joined Moreton Bay Regional Council in 2009 and her current role is in the Environmental Planning and Policy team that takes a lead role in the establishment of region wide - environment and sustainability, data, policies, strategies and programs. Jessica is responsible for a range of projects in the areas of catchment planning, sustainable development, environmental management and climate change adaptation. A key objective of the work she is doing, is enhancing the region's sustainability and protecting the natural environment.

Janina Kaluza has undertaken extensive, multi-faceted research since 2011 to assess the conservation status of the vulnerable water mouse (*Xeromys myoides*) in southeast to east-central Queensland. The water mouse is one of Australia's most enigmatic, and least understood vertebrates because of its association with coastal wetlands of Queensland, the Northern Territory and Papua New Guinea. Quantifiable findings obtained through the examination of 442 water mouse nests, an analysis of meteorological events and adverse threats suggest that the water mouse's ability to cope is being severely tested. From these findings, a framework of action was presented in her thesis titled "The ecology and conservation of the water mouse (*Xeromys myoides*) along the Maroochy River Catchment in southeast Queensland", and if implemented, could substantially arrest the present decline of its' Australian population.

Abstract:
Both the dugong (*Dugong dugon*) and water mouse (*Xeromys myoides*) are found in the Pumicestone catchment and are listed as vulnerable under the Nature Conservation (Wildlife) Regulation 2006.

The most recent research conducted on dugongs in the Pumicestone Passage is a paper published by Janet Lanyon et al in 2005. This research indicated that the Pumicestone Passage is used by dugongs year-round despite winter water temperatures that are known to cause dugongs to migrate elsewhere. All dugong sightings occurred in the southern part of the passage, south of Tripcony Bight. Dugongs were associated with shallows that support *Halophila* and *Halodule* species of seagrass. The northern part of the passage also supports these seagrass species and has a similar water temperature range to the southern passage. However, the seagrass beds are less extensive, and the narrow channels and very shallow nature of the northern passage provides little to no deep-water refugia for dugongs.

Water mice are small nocturnal animals that build large mud nests like termite mounds, where they and their young can escape the highest tides. They are a key bio-indicator of the health of coastal wetlands and the effects of climate change. They are currently under threat from cats, foxes and pigs; and habitat loss from urban, industrial and agricultural development, mining, pollution, and insecticides (Kaluza 2018). Research completed by Janina Kaluza in 2018 is the first comprehensive research that addresses the conservation and ecology of the water mouse in South East Queensland, including the Pumicestone Passage.

Session 6. Climate impacts and adaptations
Host: Dr Gabriel Conroy, University of the Sunshine Coast

6.1 Our Resilient Coast, Our Future- A Coastal Hazard Adaptation Strategy for the Sunshine Coast
Gary Duffey, Gillian Smith, Julian Wakefield, Sunshine Coast Council

Gary Duffey has spent the last 29 years working in Local Government on the Sunshine Coast. Prior to 2007, Gary was involved in implementing and educate on an extensive range of State and Council local laws and policies, applicable to environmental health and environmental planning. Since 2007, Gary has been employed within the Sunshine Coast Council's Environment & Sustainability Policy Branch where he has been responsible for the development, implementation and review of a range of strategically focussed policies, strategies and programs in the areas of climate change and sustainability. Gary has a number of undergraduate and post graduate qualifications including a Master of Climate Change Adaptation which was awarded by the University of the Sunshine Coast in 2009.

Abstract:
Our coast includes 60km of open shoreline and 70km of lower estuary foreshores, and is the defining natural asset of our region. It includes 248 beach accesses and 21 patrolled beaches, and underpins our economy and lifestyle.

'Our Resilient Coast, Our Future' is a project to develop a long-term Coastal Hazard Adaption Strategy that will:
- ensure a shared understanding of coastal hazards, risks and preferred adaptation approaches
- enable proactive planning and protection of coastal values and natural and built assets
- reduce risk exposure and costs to council and the community.

The strategy builds on comprehensive technical work, including:
- updating existing State mapping of areas exposed to coastal hazards
- a leading-practice and tailored coastal hazard risk assessment
- developing and applying a framework for adaptation, including pathways and actions.

The Strategy includes over 50 region-wide adaptation actions, as well as location-specific pathways, from present day to 2100. Along the Pumicestone Passage – from Kings Beach down to the southern council boundary – pathways incorporate responses to specific local issues, such as:
- limitations of source sand for local renourishment
- complicated areas of coincident tidal and catchment flooding
- need to build resilience of natural assets to preserve their high values over time
- implications of a northern Bribie Island breakthrough.

Developing the Strategy has been a joint project with the Queensland Government and Local Government Association of Queensland under the QCoast2100 program, and has involved several phases of rigorous community. When finalised in early 2021, it will provide us with a robust and adaptive plan to maintain a resilient coast, including the Pumicestone Passage, into the future.

6.2 Northern Bribie Island ocean breakthrough - coastline evolution in the spotlight.
Sel Sultmann, Queensland Government Department of Environment and Science

Sel Sultmann is a Principal Coastal Scientist with the Department of Environment and Science and has been involved in coastal management with the Queensland government for over 30 years. This includes development of coastal policy and legislation and creation of statutory tools and mapping for planning and development assessment. Historical roles include development assessment in coastal hazard areas, research into coastal dune stabilisation and management, and sand dune reconstruction and revegetation projects. Currently he has a key role in delivery of the $13M QCoast2100 program which is assisting Queensland's local governments to develop coastal hazard adaptation strategies to address sea erosion, storm tide inundation and the emerging threat of climate change sea level rise.

Abstract:
Northern Bribie island has been eroding for many years and it's been suggested for some time that the island could eventually break in two. In December 2020 that reality came very close. So what is the story of this long-term change and what may happen in coming years? This presentation provides a broad overview of the morphological evolution of northern Bribie Island and the forces driving that change. There is no end point to this evolution but there are some clues as to the trajectory it's on and therefore the future forms of this coast.

So is this change a problem and should something be done? We need to view this question through the prisms of both preserving the high natural values of this area and the possible threats to development and the local community.

6.3 MBRC Living Coast: Coastal Hazard Adaptation Strategy
Glen Dare, Moreton Bay Regional Council

An Environmental Planner with over 15 years of experience in local government, Glen Dare is leading Moreton Bay Regional Council's coastal hazard planning that focuses on building resilience and community empowerment. Previously he has led the development of planning scheme codes including flooding, waterway, stormwater and coastal hazards for new development, and stormwater and park infrastructure planning within the Local Government Infrastructure Plan that identifies infrastructure to support new development.

Abstract:
One of the first steps in developing the Living Coast: Coastal Hazard Adaptation Strategy (CHAS) for the Moreton Bay Regional Council area is identifying what is important to the community about the Moreton Bay coastline and estuarine environments. By understanding what is important to our community, Council can develop a strategy that better incorporates the needs and interests of land and asset owners, and coastal communities. This shared understanding will help inform the most appropriate coastal management options for our region. Currently an online community values survey is open of which Council will have preliminary results to share at the conference. Council is also taking registrations to participate in a community reference group. It has also delivered several CHAS pop-up information sessions.

The CHAS will help Council and the community make better decisions to mitigate potential risks from coastal hazards by informing:

- Land use planning and development assessment
- Infrastructure planning
- Asset management
- Management of nature conservation, recreation and cultural heritage values
- Emergency management

6.4 Viewing the Pumicestone Catchment through the lens of ecosystem functions and services
Dr Simone Maynard (USC), Naomi Forrest, Bianca Keys, Dr Graham Ashford

Dr Simone Maynard is an applied multidisciplinary researcher specialising in 'ecosystem services' (the positive contributions of nature to human well-being). She has specialist skills in methods to collect, develop and integrate diverse forms of knowledge and data into ecosystem service assessment tools for use in planning and natural asset management. She has considerable international experience, including contributing to numerous UN biodiversity assessments. She is the Lead, IUCN CEM Ecosystem Services Thematic Group, on the Editorial Board for the journal Ecosystem Services, and the Founder of the Oceania Ecosystem Services Forum, and a Post-Doctoral Research Fellow at USC.

Bianca Keys is a final year Bachelor of Animal Ecology student at USC, with a special interest in geospatial analysis, restoration and conservation, and marine science. She possesses a broad range of skills including fieldwork techniques, research design and statistical analysis, and developing conservation strategies for animal populations facing contemporary threats.

Naomi Forrest is a final year Bachelor of Environmental Science (Sustainability) student at USC with a special interest in conservation and sustainability in local contexts, particularly in the Sunshine Coast region. She possesses specialist skills in stakeholder engagement, geospatial science, global change ecology and climate change adaptation and mitigation.

Dr Ashford is an environmental economist with considerable experience designing and managing complex research and capacity building projects for governments and international organisations focused on environmental management, sustainable development and climate change. He is a Senior Lecturer at USC.

Abstract:
Sunshine Coast Council and the University of the Sunshine Coast (USC) are implementing a collaborative research project to develop a more comprehensive understanding of ecosystems functions and services provided by our natural assets and how they contribute to our economy, health and well-being, local and regional amenity and liveability. Understanding our natural environment and the way it adds value to the Sunshine Coast will help inform complex decision-making and future policy outcomes and support our continued need to invest in the region's natural assets.

A foundational stream of work in this project has focused on 'localising' the SEQ Ecosystem Services Framework methods and techniques developed under SEQ Catchments' collaborative project (2005-2013). From this we produced detailed spatial representations of 19 critical ecosystem functions occurring in the Sunshine Coast landscape, and the relationship between those functions and the provision of ecosystem services that underpin our wellbeing.

The presentation will begin with an overview of the project and an explanation of the conceptual framework and methods used in the research before discussing some of the key findings as they relate to the Pumicestone Catchment. The presenters will discuss the impacts of climate change and the implications for policies and action plans. An accompanying poster display will provide participants with an opportunity to examine the mapping of key ecosystem functions in more detail and to talk to the researchers involved in their production.

6.5 Monitoring erosion on pineapple farms using drones
Dr Javier Leon, University of the Sunshine Coast

Dr Javier Leon is a geographer with research interests in the study and management of landscapes under a changing climate context. He is a world-leading researcher in the application and analysis of drone-derived data. He has developed and collaborated in multidisciplinary research projects combining field data and geospatial techniques in study sites across Australia, the Pacific islands and Peru. More recently he has designed, implemented and collaborated in citizen science programs including monitoring seagrass meadows using drones, monitoring restoration of dunes with native vegetation and monitoring shoreline change using crowd-sourced mobile devices.

Abstract:
The Australian pineapple fresh sector has expanded considerably over the last 15 years due mainly to the adoption of better fresh market varieties and improved quality. The best soils for pineapple production are non-compacted, well-aerated and free-draining loams, sandy loams and clay loams with no heavy clay or rock within one metre of the surface. However, soil erosion is a big issue negatively affecting pineapple growers and water quality throughout the catchment. Farmers on the Sunshine Coast have been embracing new methods of controlling soil erosion, including the application of a heavy duty and robust polymer emulsion. This presentation will outline the application of drones and novel image analysis techniques to mapping and monitoring soil erosion at very detailed spatial and frequent temporal scales. Surveys were undertaken approximately monthly with a survey-grade drone over different plots with different polymer treatments. Erosion pins and RTK GPS control points were used as ground reference data. Preliminary results show that drone surveys can achieve a vertical accuracy of ~2 cm and detect changes in elevation between surveys of ~4 cm with a 95% confidence level. A maximum erosion of 15 mm (bed) and accretion of 35 mm (furrow) has been observed using the erosion pins since the start of the surveys. This is attributed to the notable below-average-rainfall conditions over the last 2 years.

DAY 2 – 17 February 2021

Session 7: Terrestrial Habitat & Species
Host: Ben McMullen, Moreton Bay Regional Council

7.1 Protecting the biodiversity significance and nature conservation values of the Pumicestone Region
Shannon Mooney, Healthy Land and Water

Over the last 15 years, Shannon has collated, developed and implemented a Corporate GIS System that underpins Healthy Land and Water's business strategy and investment initiatives. This work has enabled and informed the South East Queensland Natural Resource Management Plan, Ecosystem Health Monitoring Program, Report Cards, SEQ Atlas and numerous decision support tools.

Shannon has been involved in a suite of Biodiversity and Nature Conservation Programs including the Qld Fire and Biodiversity Consortium, SEQ Land for Wildlife, SEQ Rainforest Recovery, SEQ Koala Advisory Council and Koala Arks, Moreton Bay Ramsar, and various state and local biodiversity planning and policy initiatives. I look forward to sharing some of the work Healthy Land and Water is involved in to better understand the biodiversity values of the Pumicestone Region.

Abstract:
The Pumicestone Passage has many outstanding ecological values and is also recognised internationally as a wetland of importance under the Ramsar Convention. However, land use change and population growth are adding increasing pressure on the biodiversity values of the region. Recent fires and coastal erosion are ongoing threats requiring new and 'old' approaches. Ongoing management efforts are needed to conserve and restore this important area. Areas with national and state environmental significance in the Pumicestone Region include wader habitat, threatened species and wildlife habitats, wetlands, saltmarsh and lowland rainforest endangered ecological communities, and vulnerable and poorly conserved forests.

Maintaining connected, healthy habitat and waterways is essential to sustaining the biodiversity and ecological significance of the region. The extent and condition of core and connected forests across the Pumicestone provides ecological networks within the coastal and estuarine environment to the uplands via waterway and riparian forests connecting with D'Aguilar and Blackall Ranges linkages. The Pumicestone Passage Marine Park is also part of a series of global marine sites considered critical to the health of the world's oceans.

Over 10,000 high precision records of rare and threatened species have been recorded for the area. Some significant species include the Australian lungfish, Macadamia sp., Christmas bells, dugong, eastern curlew, glossy black-cockatoo, koala, long-nosed potoroo, platypus, powerful owl, Richmond birdwing butterfly, southern greater glider, and the spotted-tailed quoll.

Healthy Land and Water and its partners are leading many strategic initiatives to halt or reverse the decline in natural asset condition across the Pumicestone Region. It is also undertaking a major review of the South East Queensland Natural Resource Management Plan, which includes assessing and updating progress against targets set out in the plan. This includes review of the coastal and nature conservation assets. Anyone interested in being part of the NRM Plan review is invited to get involved during the engagement process, which begins on Day 3 of this conference.

7.2 Northern Pumicestone Passage Core and Connecting Habitat Mapping of the Northern Pumicestone Catchment
Richard Newton, Sunshine Coast Council.

Richard Newton completed a Bachelor of Science (Environmental Science) at USC in 2004, majoring in Marine Ecology and Environmental Management. Since then Richard has worked for the Sunshine Coast Council for more than 16 years in environmental management roles and has been Council's Ecologist for the past 10 years. Richard sits in the Biodiversity and Waterways team, which is in the Environment and Sustainability Policy Branch of Council and is responsible for the development of strategic policies and strategies delivering biodiversity conservation across the local government area.

Abstract:
Sunshine Coast Council's biodiversity conservation planning is guided by a "landscape ecology" approach. We seek to maintain and improve ecological functionality and connectivity at a whole-of-landscape scale, by:

Council has developed comprehensive habitat mapping to better understand and inform landscape-scale ecological functionality and connectivity. The method is underpinned by mapping of native vegetation across the local government area from state (regional ecosystem) and Council (LiDAR-derived, fine-scale) sources.

A spatial fragmentation model was applied to the native vegetation layer, which used cut-offs for vegetation patch sizes and internal buffer widths to assign vegetation areas into habitat classes – primarily, "core" or "connecting" habitat areas. This powerful spatial approach captures the degree of consolidation or fragmentation of vegetation areas, which in turn affects habitat functionality, including fauna movement and dispersal, mating potential, roost sites, food resource availability and feeding regimes.

Additional datasets were then interrogated to better characterise those classified habitat areas, including threatened species records, essential habitat and threatened ecological communities and representation within the protected conservation estate.

This approach has given us a comprehensive understanding of the distribution and relationship between different habitat areas, the plants and animals they support and their role in landscape connectivity and habitat functionality. It is critical for our conservation network planning, as well as for the delivery of strategic biodiversity conservation outcomes.

7.3 Habitat Corridors - MBRC Green Infrastructure Network Program
Bernadette May, Moreton Bay Regional Council

Bernadette May currently leads Moreton Bay Regional Council's Green Infrastructure Planning Team which manages the planning, design and delivery of its capital and operational Green Infrastructure programs. This includes overseeing the installation of wildlife movement infrastructure around roads, large-scale tree planting and urban shade tree projects. She holds qualifications in law, environmental science and finance.

Abstract:
Moreton Bay Region contains hundreds of kilometres of habitat corridors. As wildlife move through these corridors, they encounter roads and land use change which present safety risks and challenges to habitat access. Unfortunately, vehicle

crashes involving wildlife are common in Moreton Bay region and affect human safety, property and wildlife. Moreton Bay Regional Council's Green Infrastructure Network Program constructs wildlife crossing infrastructure to improve public safety by reducing the risk of collisions between wildlife and motorists, and to provide native wildlife with safe crossing opportunities as they move through the region's habitat corridors. The Green Infrastructure Network program also delivers tree and habitat planting to enhance and re-establish canopy connections.

7.4 Nature conservation in the Pumicestone catchment- significant challenges with diverse solutions.
Deborah Metters, Land for Wildlife

Deborah Metters is an ecologist and environmental consultant who works in partnership with 13 councils from across South East Queensland to deliver the Land for Wildlife program. It is a program that offers personalised advice and practical support to help landholders achieve nature conservation on their properties. There are 5,000 Land for Wildlife properties across SEQ with last year (2020) delivering the highest annual growth of new memberships in the program's 20+ year history. Deborah's role as Regional Coordinator is to support the 13 councils, deliver regional LfWSEQ resources, provide regional communications and ensure continuous improvement. This presentation has been developed in partnership with Sunshine Coast Council and Moreton Bay Regional Council who deliver a suite of conservation services to Land for Wildlife members in the Pumicestone catchment. Deborah is also an avid birder who regularly visits the Pumicestone to undertake shorebird surveys.

Abstract:
Pumicestone is a complex and unique catchment with large parcels of different land uses resulting in a patchwork landscape. The Pumicestone catchment is well known for its extensive pine plantations, ex-grazing land undergoing development and intensive horticulture of pineapples, strawberries and macadamias. Significant Indigenous cultural heritage sites are found across the catchment, some of which offer rare public access to bora rings, scar trees and grinding grooves. There are major transport corridors dissecting the catchment, extractive industries including sand mining, postage stamp sized National Parks around the Glasshouse Mountains and thin ribbons of native vegetation along waterways. Overall, the Pumicestone catchment presents a significant challenge for landscape-scale conservation.

Despite the challenges, many landholders across the Pumicestone catchment have prioritised conservation on their properties or integrate conservation with other land uses. The Land for Wildlife program offers these landholders advice and support to help them manage their properties for conservation. Pumicestone Land for Wildlife members manage a diversity of properties and ecosystems including mangrove-lined littoral forests facing tidal inundation by the end of the century, agricultural farms managing small forest remnants, rural lifestyle blocks with rainforest managing environmental weeds and heathland ecosystems requiring active fire management. Some of these properties and their owners have made significant contributions to conservation. They have helped recover the Richmond Birdwing butterfly and are managing habitat for the threatened Water Mouse. They undertake regular weed management and active erosion control. While others have undertaken ecological burns and are involved in annual post-fire recruitment monitoring.

7.5 Biosecurity priorities for the Pumicestone Catchment
Stacy Harris, Queensland Government Department of Agriculture and Fisheries

Stacy Harris began her career at the Department of Agriculture and Fisheries 18 years ago after completing a Bachelor of Applied Science with a Horticulture major at the University of Queensland. Stacy somehow always knew she would end up working with weeds and was fortunate enough to become a Biosecurity Officer in 2012. Being a biosecurity officer you need to be agile and responsive, supported by equipment, procedures and training allowing us to quickly transition through terrestrial, marine, aviation and information environments to enable the effective management of an unlimited range of new threats. This work is critical in protecting Queensland's agricultural industries and environment into the future.

Abstract:
Biosecurity Queensland conducts post-border incursion response to biological threats in Queensland. The Invasive Plants and Animals (IP&A) South-East Region Operations Team mission is to prevent the establishment of new invasive species in South East Queensland in order to protect Queensland's human health, social amenity, economy and environment.
There are a number of eradication projects that operate within and in close proximity to the Pumicestone catchment area:

- Bitou bush (*Chrysanthemoides monilifera subsp rotundata*), a native of South Africa was introduced as a dune stabiliser and is ideally suited to habitats along Queensland's southern to mid coast. This project commenced in the mid 1980's and surveillance is conducted from the NSW border to Southern Fraser Island. Uncontrolled spread of bitou bush would lead to serious environmental impacts as well as cultural, social and economic costs.

- Red-eared slider turtles (*Trachemys scripta elegans*) are an exotic fresh water turtle native to the USA. A small naturalised population has been detected in the Moreton Bay Region. REST have been distributed widely via the illegal pet trade. Feral populations have now been established on every continent except Antarctica. REST are listed as one of the top 100 invasive species internationally!

- Mexican bean tree (*Cecropia peltata*) is found throughout tropical America. It is a rapidly growing tree that has the potential to invade and dominate tropical and subtropical rainforests. Because of its attractive foliage it has been subject to sale and distribution by garden enthusiasts. A total of six trees were detected during the 2019-20 financial year. Mexican bean tree can form naturalised populations in SEQ if left unchecked.

- Cacti compliance project. Biosecurity Queensland manage a cactus compliance project aimed at managing the illegal online trade of regulated cacti in South East Queensland. All species of *Opuntia, Cylindropuntia* and *Austrocylindropuntia* cactus pose serious long-term risks to Australia's arid and semi-arid rangelands, with the potential to duplicate the impact of the infamous prickly pear cactus.

7.6 Fauna presence within a conservation zone around North and South Bells Creek
Paul Smith, Wildlife Preservation Society of Queensland Sunshine Coast Branch

Paul has been involved in conservation and fauna issues on the Sunshine Coast for the last 15 years. With Post graduate qualifications in Landscape Ecology, and Data Analytics, he is the coordinator of Wildlife Preservation Society of Queensland Sunshine Coast's Faunawatch program. The program is a citizen science program with over 30 years of history gathering fauna records from the Sunshine Coast and surrounding area. It also conducts monthly surveys at the Maroochy Bushland Botanical Gardens, and an additional 10 surveys each year around the coast that are open to the public. Using species specialists, the group also conducts in-field targeted surveys for council, and land care groups.

Abstract:
Work has begun on the largest residential and commercial project on the Sunshine Coast. Covering approximately 25km2, when complete it will be home to an additional 50000 people, with direct runoff to the Pumicestone Passage. To the eastern side of the development approx. 700ha of land has been left as a conservation zone. The purpose of this project is to monitor the baseline fauna diversity and changes in the Aura Environmental Protection Zone.

This fauna survey, conducted by Wildlife Preservation Society of Queensland Sunshine Coast through the Aura Community Advisory Group, has shown a rich and diverse assemblage of fauna across the nature reserve of the Aura site. Three survey blocks in Feb/May/Nov were conducted each year from 2014 within the protection zone from the southern point of Wurumbambi, to the northern limit of the Blackbutt Forest. The project has provided the opportunity to investigate land that had been cleared, used as commercial pine plantation then cattle grazing field, and the riparian section around Bells Creek North and South.

Fauna presence surveys were conducted including: general opportunistic surveys, camera trapping, herptile trapping, and fish trap surveys for crustacean/fish within the waterways. The surveys have resulted in 238 species identified including 139 birds, 30 butterflies, 14 frogs, 14 reptiles, 11 mammals, 10 dragonflies, 6 spiders, 5 other invertebrates, 4 crustaceans and 5 fish. The value of this landscape is particularly noteworthy given the habitat investigated being mainly restricted to natural re-growth on an ex-pine plantation with predominantly melaleuca and sedge-grassland, and its surrounding open-eucalypt and mangrove vegetation communities.

Session 8: Agricultural Knowledge and Science
Host: Rachel Abel, Queensland Government Department of Agriculture and Fisheries

8.1 Regional Economic Profile of Agriculture in the Pumicestone Catchment
William Johnston, Queensland Government Department Agriculture and Fisheries

Bill Johnston is a Principal Agricultural Economist with the Department of Agriculture and Fisheries in Queensland based at the Maroochy Research Facility in Nambour. He began his career in the Burdekin working with the sugarcane and horticulture industries. He later moved to the Bribie Island Aquaculture Centre where he broadened his skills base into aquaculture and fisheries work. From there he moved to his current location working across all sectors in agriculture and fisheries. Bill has 25 years' experience in applying economic principles to assist the development of the agricultural sector and has an international reputation for extension of robust economics. He is currently undertaking a PhD at the University of the Sunshine Coast that is undertaking economic research to support rural livelihoods in Fiji and Tonga.

Abstract:
The Pumicestone Catchment extends from Caloundra to Bongaree and west beyond Beerwah and Beerburrum. It is a unique catchment that is well known for its production of pineapples and strawberries. However, it has a significance that extends beyond its iconic horticultural crops. The Pumicestone catchment covers two local government areas (LGAs), Sunshine Coast and Moreton Bay North. Broad data at the catchment level indicates that there are 159 agricultural businesses generating approximately $390 million in gross value. This represents 2.5% of the total gross value of Queensland agriculture. Horticulture, more specifically, generates $247 million (63%) of the catchments gross value of agricultural production (GVAP). Drilling down even further, intensive horticulture (i.e. nurseries, glasshouses, shade houses) generate $102 million GVAP, perennial horticulture (i.e. pineapples and tree crops) generate $99 million GVAP, and seasonal horticulture (i.e. strawberries and other annual crops) generates $47 million GVAP. While we can generate broad data for the Pumicestone catchment, much of the specific crop data will be presented across the two LGAs mentioned which when combined have a GVAP of $750 million. The data sources do not provide a level of detail to draw out the specific crop data, however, the Pumicestone represents over half of the GVAP for the two LGAs.

8.2 Water Quality Monitoring for nitrate and pesticides in the Pumicestone Passage Catchment
Dr. Reiner M. Mann, Queensland Government Department of Environment and Science

Dr Reinier Mann is the current Science Leader within the Water Quality and Investigations group within the Queensland Department of Environment Science, and oversees the Great Barrier Reef and South East Queensland Catchment Loads Monitoring Programs. He obtained a PhD in Ecotoxicology (2000) from Curtin University in Perth, Western Australia, and has over 15 years experience in ecotoxicology research, specialising in amphibian and reptile ecotoxicology. He is an author of over 40 peer reviewed journal articles and book chapters in the discipline of environmental toxicology and co-edited Ecological Impacts of Toxic Chemicals published in 2011. Dr Mann is the foundational and current editor of the Australasian Bulletin of Ecotoxicology and Environmental Chemistry, which is the official publication of the Australasian Chapter of the Society of Environmental Toxicology and Chemistry –Asia Pacific (SETAC AU).

Abstract:
As part of the South East Queensland Catchment Loads Monitoring Program, Water Quality & Investigation (Department of Environment & Science) collect water samples from Coochin Creek using a combination of manual and automated sampling, and opportunistically from Six Mile and Lagoon creeks. Water samples are analysed for TSS (sediment), nutrients and a suite of pesticides. Historically the nitrate concentrations have exceed water quality objectives and some pesticides have exceeded national or draft guideline values. This presentation will present some of the historical and recent data.

8.3 The SEQ Water Quality Project for horticulture growers
Lene Knudsen and Rowena Beveridge, Growcom

Lene Knudsen is the SEQ Water Quality Facilitator & Climate Program Coordinator at Growcom – the peak industry body for production horticulture in Queensland. Lene holds a Masters degree in Climate Change Adaptation and has over 9 years' experience delivering extension projects on water quality, climate change and natural disaster recovery & resilience for the horticulture industry. Lene has developed the climate risk module for Hort360 – the horticulture industry's Best Management Practice tool. She was one of the main authors for the Queensland Agriculture Sector Adaptation Plan.

Abstract:
Growcom's SEQ Water Quality Project funded by the Department of Environment and Science has worked with horticulture growers in the Pumicestone Catchment for over five years. The key objectives of the project are to promote horticulture best management practice and address nutrient and sediment loss into local waterways. This is done by providing water quality and sediment risk assessments via Hort360 – the horticulture industry's best management practice tool, property maps and mapping technologies such as NDVI (Normalised Difference Vegetation Index), LiDAR (Light Detection and Ranging) and EM (Electro Magnetic Conductivity) to growers. All tools that support growers in optimising erosion, sediment and nutrient management on farm. Besides engagement with growers, the project team also coordinates a research and trial group of industry experts working to explore new management practices to further limit nutrient, pesticides and chemical runoff. This talk with present data and outcomes of the project to date.

8.4 Sam Pike - Sandy Creek Pineapple Farm

Sam Pike is a fourth-generation pineapple farmer at Glass House Mountains. After being back on the farm for ten years, Sam has now taken over the farm operation from his dad Murray who was a pioneer in fresh fruit. Sam has been on the board of Australian Pineapples as a representative for South East Queensland for four years and has become known for his innovative approach to machinery modification for efficiency, organic management and erosion control for environmental and economic dividends. Sam has just welcomed the fifth generation on to the family farm with the birth of son Ryan last year.

8.5 Jade King - Green Valley Finger Limes

Jade has a passion for soil chemistry, plant physiology, entomology and all things agricultural. With over 15 years' experience in Soil Science and Agronomy, Jade's experience ranges from laboratory soil analytical testing to in-field soil remediation and agronomic services. She was awarded Under-Graduate Award for Excellence in Soil Science whilst studying and has since founded an Agricultural Science department for the local college as well as the Agronomic Services department for the local cooperative, and now finally established an independent professional Agronomy Consultancy business.Jade owns and operates a productive Australian native fingerlime farm at the headwaters of Coochin Creek, Beerwah, and is an active member of the Sunshine Coast Food and Agribusiness Network (FAN).

8.6 Gavin Scurr - Pinata Farms

Gavin Scurr of Pinata Farms is a seasoned fresh produce grower and industry leader respected for farming innovation and commitment to quality. Gavin drives an expanding business with more than 1,010 hectares under cultivation and a seasonally fluctuating workforce spread over multiple locations. He identifies growth opportunities and makes sure the company's strategic direction is in line with quality – the cornerstone of Piñata Farms' philosophy – as well as family values.

Gavin's proudest achievements include expanding pineapple production to Mareeba in 1996 and identifying the Honey Gold mango variety as suitable for commercialisation. A hands-on visionary, Gavin heads a management team and board of directors. He is former chairman of the Australian Mango Industry Association (AMIA), a current director of the Raspberry and Blackberry Australia (RABA) board and also the Australian Fresh Produce Alliance (AFPA). He is also on the NT Farmers Association board, a member of the pineapple industry marketing advisory committee and Managing Director of joint venture company, BerryWorld Australia.

8.7 Anthony Heilig - GoTurf
Anthony Heilig is a third generation farmer in the Pumicestone Catchment, and has been involved with the Pumicestone Region Catchment Management since the 1990s. His family has farmed pineapples, sugar cane, bananas, vegetables and now turf. They are continually working to improve their farm efficiency and profit, and reduce their impact on the waterways. With his wife and family, they are the largest family owned and run turf farm on the Sunshine Coast. Their largest farm bounds the Pumicestone Passage.

8.8 Research into farming systems focussing on water quality outcomes and sustainable farming systems.
Rachel Abel, Queensland Government Department of Agriculture and Fisheries

Rachel Abel is a Development Horticulturalist within the Horticultural Farming Systems group in the within the Queensland Department of Agriculture and Fisheries. She has a Bachelor of Agricultural Science from the University of Melbourne. She has held agronomy roles for both fertiliser companies and primary producers prior to moving into research agronomy-based roles. Rachel has had over 13 years' experience in agronomy and research to bring to the Resilient Rivers research.

Abstract:
Resilient Rivers is a Queensland Government funded program that within Pumicestone catchments has primarily investigated nitrogen movement in horticultural farming systems. The goal being to improve nitrogen use efficiency in South East Queensland cropping by providing positive outcomes for horticultural industries and the environment. An edge-of-field nitrogen mitigation system knowns as a woodchip bioreactor wall was installed on a pineapple farm near the Glasshouse Mountains and is very efficient at nitrate removal from shallow groundwater entering adjacent aquatic ecosystems. Additional monitoring of the flow of nitrogen over time in such farming systems has identified the nitrogen use efficiency of key crop management practices. Practical industry linked trial work is being used to integrate the use of higher nitrogen use efficiency practices into individual farming systems. This leads towards a systems approach for nitrogen nutrition and maintenance of crop productivity while minimising environmental impacts from off-farm nitrogen losses.

8.9 Panel Discussion
with Tim Wolens

Tim Wolens has 25 years' experience in agriculture and horticulture both domestically and overseas. Tim graduated with honours from University of Queensland with four qualifications in Applied Science in the fields of agronomy, rural technology, plant protection and environmental and production Horticulture. He spent a number of years in DAF at the University of Queensland undertaking research in the cotton industry, and in private entities in the seed and grain industries. In more recent times he has worked in the private sector primarily with large American corporate entities undertaking supply chain work, and has now moved on to private consultancy whilst continuing research roles in horticulture.

Session 9: Sustainable Development
Host: Professor Claudia Baldwin, University of the Sunshine Coast

9.1 Pumicestone Planning considerations
Professor Claudia Baldwin (BA, MA (UW, Canada), PhD (UQ)) teaches Urban Design and Town Planning at University of the Sunshine Coast. Her research interests focus around engaging communities for change. She specialises in using participatory and visual methods to research institutional and social-environmental change and consensus-building on topics as diverse as water allocation, coastal planning, rural and regional land use, and climate change adaptation as well as affordable housing and ability and age-friendly communities. She has worked for the National Water Commission in evaluating progress towards water reforms in Australia. Her book, Integrated Water Planning: Achieving Sustainable Outcomes (2014, translated into Chinese) is based around the need for appropriate evidenced-based water planning in developed and developing countries. A more recent edited book, Natural Hazards and Disaster Justice: Challenges for Australia and its Neighbours (2020) captures risk, resilience, participation, and justice related to disasters.

9.2 MBRC Outdoor Recreation Plan 2019 - 2031
Hannah Myers, Moreton Bay Regional Council

Hannah Myers joined Moreton Bay Regional Council in 2019 as part of the Parks and Recreation Planning team to finalise and deliver Council's Outdoor Recreation Plan 2019-2031. Hannah is responsible for the forward planning for the future of recreation in the Moreton Bay Region including the planning for supporting infrastructure for recreational activities including Bushwalking, Mountain Biking, Horses Riding, water sports and much more. A key objective of the work she is doing, is balancing the demand and pressure for more recreational opportunities with the environmental, conservational and cultural values of the areas where these activities typically take place.

Abstract:
In relation to physical activity in Australia, the largest growing trend is outdoor recreation. Outdoor recreation activities fall outside the scope of traditional organised sport and are typically undertaken in natural settings and require little built infrastructure. As a service provider in our community, Council has a significant role to play in providing access to these recreation opportunities and has historically invested heavily in conventional recreation facilities such as coastal pathways, swimming pools and sporting facilities, however, as new trends emerge, it is important that Council adapts its planning to meet community expectations.

Specifically, the Outdoor Recreation Plan 2019-2031 (ORP) addresses popular outdoor recreational activities such as bushwalking, mountain biking, trail horse riding and water activities. It does not address intensive motorised recreation. The purpose of the Outdoor Recreation Plan is to outline the future strategic direction and recommendations for outdoor recreation in the region and to strike a balance that integrates community expectations, financial sustainability, environmental and cultural values with the growing demand for access to natural areas for outdoor recreation purposes.

9.3 Inter Urban break Outdoor Recreation Plan
Stacey Bentley, Sunshine Coast Council

Stacey Bentley is the Senior Open Space and Recreation Planner for the Open Space and Social Policy team at Sunshine Coast Council. Stacey is responsible for the development, implementation and review of the strategic and longer term open space and recreation planning on the Sunshine Coast. Stacey holds a Bachelor of Business and a Diploma of Local Government Planning and has worked in Local Government for 5 years now. Stacey employs an integrated approach to open space planning and is a passionate advocate for sustaining green space on the Sunshine Coast.

Abstract:
The Inter-urban Break (IUB) is a 63,000-hectare area that overlaps the Sunshine Coast Council and Moreton Bay Regional Council areas. It encompasses the scenic Ramsar wetlands of the Pumicestone Passage, the iconic Glass House Mountains, forested and agricultural landscapes and most of Bribie Island. The South East Queensland (SEQ) Regional Plan recognises the IUB as a valuable non-urban space separating Greater Brisbane and the Sunshine Coast. Protecting this buffer is a key goal of Sunshine Coast Council's Environment and Liveability Strategy. The IUB is one of SEQ's most popular locations for outdoor activities, including bushwalking, climbing, four-wheel driving, mountain biking, fishing and trail-bike riding.

The purpose of the Inter-urban Break Outdoor Recreation Plan is to guide planning for recreational activities throughout the area. It was developed in partnership by Sunshine Coast Council, HQPlantations, the Queensland Parks and Wildlife Service, Sport and Recreation Services Queensland and Moreton Bay Regional Council. Many of the activities covered under the plan have different needs. Also, the community groups involved in these activities have different views on how the area should be used. The plan recognises that these different views all need to be considered in the management of recreation across the area.

The Outdoor Recreation Plan provides land managers with a guide for supporting a wide range of recreational opportunities in suitable locations across the IUB. Critically, it balances support for these activities with protection of the natural beauty of the landscape that makes it such an outstanding recreational destination in the first place.

9.4 Sustainable Urban Development Practices – Raising the bar in Environmental Stewardship at Aura
Mark Stephens, Stockland

Mark Stephens joined Stockland in 2007 and leads sustainability planning, environmental management, infrastructure delivery and community development for one of Australia's largest master planned communities, Aura. Mark's industry experience spans over 20 years in Property Development with qualifications in Environmental Science and Landscape Architecture fuelling his passion for delivering sustainable communities.

Abstract:
Aura is a city building project being developed by Stockland over 2,300ha of previously cleared land located on the southern end of the Sunshine Coast within the Pumicestone Passage Catchment. Traditional approaches to urban development have been elevated at Aura ensuring sustainability and protection of the environment is front of mind. Key elements include Aura's approach to total water cycle management (both in construction and operational phases of the project) and the focus on achieving a net gain in biodiversity, rehabilitating up to 700ha of coastal habitat for rare and threatened species including acid frogs. Working closely with the community, Aura is setting new benchmarks demonstrating that urban development can occur within close proximity to sensitive receiving environments, accommodating important population growth needs for the region whilst protecting the environment.

9.5 Sustainable Water Management - Innovative options for delivering a water resilient coast
Jane-Louise Lampard, University of the Sunshine Coast

Jane-Louise Lampard is the Program Leader for Environmental Health at the University of the Sunshine Coast. Jane-Louise has qualifications in business, public health and environmental and has been actively researching risks to human and ecosystem health associated with recreational waters, wastewater and stormwater since 2008. Her PhD research focuses on the microbial risks associated with pathogenic bacteria in stormwater. She is currently working with local and state government and private industry partners on projects related to safe reuse of urban stormwater runoff, limiting the impact of urban stormwater runoff on aquatic ecosystems and creating water sensitive cities.

Abstract:
Water Security on the Sunshine Coast needs some innovative thinking if we are to provide the water resources required to support our growing population. Urban Stormwater Harvesting is a proven option that should be considered to support our water resilience strategy. Urban developments that adopt water sensitive design measures such as those at Aura are able to harvest high quality treated urban stormwater for reuse, supporting our water demands. Significant research undertaken

has concluded that water from urban sources is of a high quality and should be strongly considered by water regulators as part of a balanced approach to regional water security.

9.6 Using constructed Floating Wetlands to treat urban runoff in a Saline Waterway
Kevin Covey (Pelican Waters Heart Pty) and Jane-Louise Lampard, Dr Luke Verstraten, Katie Roberts & Associate Professor Neil Tindale

Kevin Covey is the Managing Director and Principal Engineer of Covey Associates. Kevin brings to all projects his more than 39 years' extensive expertise in Urban Development, Civil, Structural, Hydraulic, Fire Engineering and Project Management. Kevin leads a team of over 55 staff who have become internationally and nationally renowned as a "one-stop-shop" in both design and solution driven approaches to all aspects of development. The team offer a wide range of services to suit the needs of any project.

Abstract:
The developer of Pelican Waters (Pelican Waters Heart Pty Ltd) has collaborated with Covey Associates and the University of the Sunshine Coast, Sunshine Coast Regional Council and SPEL to trial a Floating Treatment Wetland (FTW) in a recently constructed canal development that is linked to Pumicestone Passage in Queensland, Australia. FTWs function like ahydroponic system, where plants grow in a buoyant, soil-less media and the roots uptake nutrients directly from the water. This world first project aims to fill several knowledge gaps; A) what plant species will grow in saline conditions, B) how do plant root masses act to remove pollutants during rainfall events, and C) what cost benefits do an FTW approach have over traditional measures of treating stormwater in flat, coastal developments. To date, plants have been successfully established and a monitoring system has been installed at the FTW in Pelican Waters, which aims to treat new and existing development areas. This system is triggered by rainfall and flow and captures runoff over storm events at the inlet and outlet of the FTW. This sampling regime will help to determine what level of pollution the FTWs remove during rainfall events. If successful in treating runoff, the FTW will provide a more effective solution for flat, coastal developments, which typically require numerous stormwater treatment devices (e.g. bioretention basins) to overcome the issues with stormwater drainage on flat sites. By being able to establish an end of line solution in a coastal, land reclamation development, it creates a more efficient treatment system and reduces the number of treatment devices the developer has to build and that Council will ultimately have to manage.

9.7 Managing safety, productivity and stewardship in a peri-urban, commercial plantation forest
Michael Robinson and Michelle McAndrew (HQPlantations)

Michael Robinson has worked in the forest and timber industry with a focus on sustainable, commercial plantation timber production for over 40 years. He has a Bachelor degree in Forest Science and has held a range of field, operational policy development, research and development management and senior management roles. He is currently the Regional Manager for HQPlantations Coastal and Central Queensland Region with responsibility for the management of plantations from Beerburrum to Byfield in Central Queensland.

Michelle McAndrew grew up in Southern NSW on Ngunnawal Country and has always had a passion for sustainable land use. She has Bachelor degree in Forest Science and has been a forester with HQPlantations and its predecessors for 20 years. Michelle is the Stewardship Systems Manager for the company and is responsible for ensuring the forest practices and systems in place meet the requirements of contemporary, third party verified, sustainable forest management standards.

Abstract:
HQPlantations sustainably manages 27,000 ha of softwood plantations within the Pumicestone Catchment on behalf of institutional investors. The plantations are mostly on State land, available for public access and recognised as an important part of inter-urban break. The area is experiencing exponential growth in outdoor recreation, compounding management issues of this important commercial plantation timber production area and green space that extends from the D'Aguilar Range to the Pumicestone Passage shoreline. Providing a safe workplace, managing increasing recreation demand of lawful and responsible recreation as well as unauthorised and illegal activities to within the constraints of the delegated powers of the landowner and available resources is an ongoing issue.

The challenges include (in no particular order):
- A sense of entitlement associated with public land
- Public disregard for the safety of others and wilful destruction of environmental values and property
- HQPlantations has very limited powers to enforce compliance with legal requirements for public use and access.
- Increasing pressure expected from new and future residential developments on the plantation boundary
- Conflict with primary business purpose and maintaining commercial viability

Management actions include developing partnerships and involving key regulators, land managers and community groups. Several existing and planned initiatives will be discussed in this presentation.

Session 10: Poster presentations

10.1 Constructed Floating Wetlands to treat stormwater pollution in a Coastal Canal
Dr. Luke Verstraten, Katie Roberts, Jane-Louise Lampard, & Associate Professor Neil Tindale, University of the Sunshine Coast

Dr. Luke Verstraten is a PhD in Civil Engineering teaching in the areas of statistics and climate change mitigation and adaptation. His research areas include soil carbon sequestration, hydraulics of drainage, water pollution, and sustainable water futures.

Abstract:
Constructed floating wetlands (CFWs) have been used as water treatment devices in freshwater lakes, stormwater ponds and wastewater effluent ponds. This study investigated the suitability of CFWs as stormwater treatment devices within a coastal canal development, linked to the Pumicestone Passage in Queensland, Australia. The use of CFW's in coastal canals presents design and efficacy considerations that differ from freshwater. Tidal oscillation of the canal system creates challenges unique to brackish environments, due to the variance in water levels and salinity. Innovative, in-situ, testing at the coastal canal CFW site, identified that a pycnocline is formed when low-density stormwater is received into the saline canal waterbody. In the 950 mm deep wetland embayment at the study site, stratification limited mixing of incoming stormwater to approximately the upper 370 mm of the embayment. Dilution of the stormwater in the embayment was reduced as a consequence. Additionally, stratification impacted on water sample collection within the embayment, making it difficult to

collect representative samples. To prevent water in the embayment becoming stagnant, or drying out, between rainfall events, the system has been designed to allow for daily flushing to occur during tidal cycles. This affected the residence time of stormwater within the embayment and the time over which pollutant removal by the CFWs occurred. It also adds further complexity to the collection and evaluation of water sample data to evaluate treatment efficiencies of CFWs in coastal canals.

DAY 3 – 18 February 2021

Session 11: Knowledge Informing Action
Facilitator Dr Paul Maxwell (Alluvium)

With over 15 years managing large scientific programs with a key focus on infusing research into good policy and environmental management, Paul has worked extensively with local and state governments, community groups and industry to achieve practical and innovative outcomes for natural resource management. He has led programs spanning a wide range of fields requiring extensive collaboration with researchers and practitioners from a diverse range of backgrounds (including social science and environmental economics). Key projects include: Managing the Ecosystem Health Monitoring Program and the Healthy Land and Water Report Card for Catchment Health; Unravelling the drivers of greenhouse gas emissions in estuaries; and Unlocking the secrets of mangrove conservation success.

Presentation of summaries and research gaps from Days 1 and 2.

11.1 The Pumicestone Catchment Management Program – Working together to preserve the Pumicestone Passage and its catchment
Graham Webb, Sunshine Coast Council

Graham Webb grew up in and around waterways – swimming, canoeing and sailing in streams, lakes and coastal waters of North Queensland. He studied Biochemistry and Environmental Science at the University of Queensland, including a postgraduate thesis with the Marine Botany group. He then spent six years monitoring, assessing and reporting on water quality and ecological health of South East Queensland waterways with the state Environmental Protection Agency. Since then, from 2005, he has been with Sunshine Coast Council, using scientific knowledge, policy and storytelling to help preserve the region's natural waterways and wetlands for the enjoyment of future generations.

The Pumicestone Passage and its catchment enrich our region, but in the face of continuing population growth and climate change, we can't take them for granted. Sustained and coordinated efforts are needed to preserve their irreplaceable environmental and social values – including the Ramsar-listed estuary and the threatened marine species and shorebirds it sustains.

For nearly a decade, Sunshine Coast Council, Moreton Bay Regional Council and about thirty partner groups have collaborated to preserve and improve the values of the Passage and its catchment. Our Pumicestone Catchment Network includes representatives from community, industry, agriculture, research and natural resource management groups and state and local government. We hold regular forums to share knowledge and collaborate on projects.

We have planned and coordinated our efforts through implementing catchment action plans. The first plan was for the 2013–2016 period, and we have recently completed a follow-on effort, the Pumicestone Passage Catchment Action Plan 2017-2020. This featured 32 actions by a wide range of organisations to:

- Improve water quality
- Enhance aquatic and bushland habitats and biodiversity
- Increase community and industry benefits and stewardship and
- Strengthen our knowledge, planning and advocacy.

Outcomes from the Pumicestone Passage Convergence will help us establish priorities for the next action plan, for the 2021–2024 period. This will guide our future collective efforts to meet the emerging and substantial challenges to the health of the Passage and its catchment and the benefits they provide us.

11.2 The SEQ NRM Plan - reviewing progress, directing the future through stakeholder participation
Liz Gould and Grace Muriuki, Healthy Land and Water

Liz Gould is passionate about biodiversity conservation. Liz enjoys collaborating to develop and translate policy and science, engaging and informing the community and achieving real outcomes for wildlife and nature. Liz has worked in natural resource management for nearly 30 years (17 with Healthy Land and Water), managing multi-disciplinary teams to deliver large and small-scale collaborative projects, primarily focused on biodiversity conservation. Major current projects include the review of the SEQ NRM Plan, migratory shorebirds, koalas and macadamia. Liz is on the Board of Great Eastern Ranges, a former member of the Gondwana Rainforests World Heritage Area Technical and Scientific Advisory Committee, interim Chair of Kholo Creek Catchment Group and involved in the Australian Citizen Science Association (Queensland Chapter). Liz is an active member of recovery teams for Eastern Bristlebird, Macadamia, Red Goshawk and Glossy Black-cockatoo and has successfully delivered multiple landscape-scale projects addressing connectivity and wildlife conservation within SEQ and through cross-regional collaborations.

Abstract:
The South East Queensland Natural Resource Management (SEQ NRM) Plan contains a set of community-agreed targets for natural assets such as air and soil, waterways and wetlands, forests and grasslands, coastal environments, as well as culture and people. Healthy Land and Water is undertaking the second review of the SEQ NRM Plan with support from research bodies, government, industry, and community. Preliminary assessment of progress against the baselines established in 2009, suggests while there have been some wins, substantial challenges remain to deliver the agreed targets by 2031.

Successful delivery of the SEQ NRM Plan relies on collaboration and coordination of natural resource management across the landscape by a diverse suite of organisations and individuals, operating at local, catchment and regional scales. Community and stakeholder involvement in the SEQ NRM Plan review are vital to understanding and resolving the challenges faced by the region's natural assets. Review of the SEQ NRM Plan is supported by funding from the Australian and Queensland Governments.

Pumicestone Song

Children playing by the waterside
Seagrass meadows green and wide
Creeks and swamps sing Nature's song
Land and water linked so strong
Land and water linked so strong

Fishermen waiting for the tide to turn
With the sea they've a living to earn
People smiling at the end of day
Hope they come back again this way
Hope they come back again this way

Let the Pumicestone creeks flow to the sea
Let the dugong and dolphin swim and feed free
Let the fruit of the land grow sweet and clean
Let the timbers grow strong
Let this land be a home to you and me
Let this land be a home to you and me

Whimbrels and curlews feed here today
with godwits soon they'll be far away
Let them come back to the mudflats and the mangrove green
To wallum creeks flowing black and clean
wallum creeks flowing black and clean

Let Caboolture creeks flow to the sea
Let the dugong and dolphin swim and feed free
Let the fruit of the land grow sweet and clean
Let the timbers grow strong
Let this land be a home to you and me
Let this land be a home to you and me

Pumicestone - special food and shelter place
Mimburi shows us another face
When our footprints wash away with time and tide
Let these waters still be clean and wide
Keep these waters clean and wide

Let Caloundra creeks flow to the sea
Let the dugong and dolphin swim and feed free
Let the fruit of the land grow sweet and clean
Let the timbers grow strong
Let this land be a home to you and me
Let this land be a home to you and me

- The late Dr Peter Oliver, who will forever dance with dugongs


Insights for a healthy future